# CANOTIA
# VOLUME 20

**The Genus *Psidium* (Myrtaceae) in the Greater Antilles**

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# CANOTIA

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**Canotia** publishes botanical and mycological papers related to Arizona, or in the case of this issue, research papers by Arizona botanists. These may include contributions to the Vascular Plants of Arizona project, checklists, local floras, new records for Arizona, and ecological studies. All manuscripts are peer-reviewed by specialists. Acceptance for publication will be at the discretion of the editor. At least 30 printed copies of each issue are distributed to libraries in the United States, Europe, and Latin America. Anyone may download copies free of charge at https://canotia.org/.

**Canotia** is named for *Canotia holacantha* Torr. (Celastraceae), a spiny shrub or small tree nearly endemic to Arizona. Cover illustration by Alandon Joe.

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# INDEX TO FAMILIES OF THE VASCULAR PLANTS OF ARIZONA

Published treatments (**in bold**) can be found in volumes 26, 27, 29, 30, 32, 33, and 35 of the *Journal of the Arizona-Nevada Academy of Science* (**JANAS**) or in subsequent volumes (1–20) of **CANOTIA**. Unbolded entries indicate families with no treatments published to date. Figure numbers refer to illustrations in the "Key to Families of Vascular Plants in Arizona" in **JANAS** 35(2). All Vascular Plants of Arizona treatments are available as pdf files online at (https://canotia.org/vpa_project.php).

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**Abstract**: The genus *Psidium* in the Greater Antilles is revised and a key to the species is provided. Each of the 16 recognized species is described, illustrated, a map of known occurrences in the Greater Antilles is provided, and representative specimens are cited. Specimens from the Caribbean region are sometimes included in the maps for wide-ranging species. For each species distinguishing features, phenology, habitat, and distribution are discussed. No new taxa or combinations are proposed, and no lectotypes are chosen. For each species a list of synonyms from the Caribbean region and sometimes beyond is provided with the citation of publications and type specimens. The relationship with *Mosiera* Small is discussed. A group of morphologically similar species nearly confined to the Caribbean region, the *Psidium amplexicaule* complex, is circumscribed and discussed. Lists of specimens examined, synonyms of accepted species, and excluded species (with type specimens and bibliographic citation) are included.

**Resumen**: Se revisa el género *Psidium* en las Antillas Mayores y se proporciona una clave para las especies. Se describe e ilustra cada una de las 16 especies reconocidas, se proporciona un mapa de ocurrencias conocidas en las Antillas Mayores y se citan especímenes representativos. A veces se incluyen especímenes de la región del Caribe en los mapas para especies de amplia distribución. Para cada especie se discuten las características distintivas, la fenología, el hábitat y la distribución. No se proponen nuevos taxones ni combinaciones, ni se eligen lectotipos. Para cada especie se proporciona una lista de sinónimos de la región del Caribe y, a veces de otras regiones, con la cita de publicaciones y especímenes tipo. Se discute la relación con *Mosiera* Small. Se circunscribe y analiza el complejo *Psidium amplexicaule*, un grupo de especies morfológicamente similares casi confinadas a la región del Caribe. Se incluyen listas de especímenes examinados, sinónimos de especies aceptadas y especies excluidas (incluyendo citaciones de especímenes tipo y bibliográfica).

## INTRODUCTION

This is the fourth in a series of regional treatments of *Psidium*. Prior treatments have been for the state of Bahia, Brazil (Landrum 2017), Bolivia and Paraguay (Landrum 2022), and Colombia (Parra-O. and Landrum 2023). An introduction to the genus, including a discussion of morphology, is given in the first of these papers and is not repeated here. A generic description and list of synonymy is also found there and not repeated here. The citation of types also follows that of Landrum (2017); types seen by Landrum, or occasionally only by one of

The Genus *Psidium* (Myrtaceae) in the Greater Antilles. Canotia 20: 1–55. 2024. © by L. R. Landrum, Z. Acosta Ramos, F. Jiménez-Rodríguez, K. C. St. E. Campbell, and Bobbi Angell (line drawings only). Posted online 20 May 2024.

the other authors is cited with an exclamation point (!), but types seen only as images do not have an exclamation point. When the portion of the protologue of a name dealing with locality included misspellings, they have usually been corrected in this paper. Many specimens can be viewed online at the CoTram portal (https://cotram.org/) and specimens from the Arizona State University may be searched by the collector and number, or accession number (e.g., ASU0004813). Many excellent specimen images from the New York Botanical Garden herbarium (NY) can be found at the same website and may be searched using collector and number. Several historical specimens have been posted at the Jamaican Virtual Herbarium (http://www.jamaicavirtualherbarium.com/).

*Psidium* is a genus of at least 60 species and perhaps as many as 100 (McVaugh 1968; Govaerts et al. 2008), ranging from Mexico and the Caribbean to Argentina and Uruguay. The distinguishing characters of *Psidium* are discussed in Landrum (2003) and in Landrum and Sharp (1989) and are: flowers (4–)5(–6)-merous (occasional flowers rarely with more petals) with multi-ovulate locules; placenta often peltate; seed coat rough or dull, covered with a pulpy layer when wet (rarely lustrous in immature seeds); hard portion of seed coat (5–)8–30 cells thick at the narrowest point, with the cells thick-walled, elongate, and overlapping; and embryo conforming to the C-shaped cavity of the seed coat, with cotyledons much shorter than the hypocotyl. Proença et al. (2022) provide an extensive discussion of important taxonomic characteristics of *Psidium* and descriptions of the four sections they recognize. Traditionally *Psidium* has been recognized as belonging to the subtribe Myrtinae, which has been shown to be a paraphyletic group through molecular phylogenetic studies (Vasconcelos et al. 2017). Lucas et al. (2019) divide traditional Myrtinae into six subtribes, considered by them to be monophyletic, based primarily on molecular data. In their classification *Psidium* belongs to the subtribe Pimentinae.

The Caribbean region underwent extensive exploration in the 19$^{th}$ and early 20$^{th}$ centuries by collectors such as C. Wright, E. L. Ekman, W. H. Harris, and N. L. Britton and collaborators. In the latter half of the 20th century J. Bisse and his collaborators made extensive collections in Cuba, as did G. Proctor in Jamaica, A. Liogier in Cuba, Hispaniola, Puerto Rico, and T. Zanoni and collaborators in Hispaniola. These collections and the groundbreaking family treatments of Jamaica (Proctor1972), Cuba (Alain 1953), Hispaniola (Liogier 1989), Puerto Rico (Liogier 1994), have been the foundation of the present treatment.

Proença et al. (2022) have recently published a molecular phylogenetic study and classification of *Psidium* based on a sample of thirty species using two chloroplast genes and two nuclear regions. Based on this phylogeny they subdivide *Psidium* into four sections: *Psidium* (type, *P. guajava* L); *Obversifolia* O. Berg (type, *P. cattleyanum* Sabine); *Mitranthes* (O. Berg) Tuler & Proença (type, *P. brownianum* DC.); and *Apertiflora* O. Berg (type, *P. myrtoides* O. Berg). Species of all these sections are found in the Greater Antilles. Two Caribbean species, *P. acranthum* Urb. and *P. amplexicaule* Pers., are included in the study of Proença et al. and appeared as sister taxa in the section *Mitranthes*.

In a phylogenetic survey of Myrtaceae of the Greater Antilles, Flickinger et al. (2020) include the same two species as Proença et al. (*Psidium amplexicaule* under the names *Calyptrogenia biflora* Alain, and *P. sessilifolium* Alain) plus three additional species of Caribbean *Psidium* (*P. harrisianum* Urb., *P. parvifolium* Griseb., and *P. rotundatum* Griseb.). These five species form a cluster, sometimes with the inclusion of *P. salutare* (Kunth) O. Berg from Cuba, appearing as sister to *P. rotundatum*. *Psidium salutare* is a widespread species, and the sample of Flickinger et al. is from Cuba. They hypothesize that *P. salutare* of Cuba may be

a product of past hybridization, which would explain why it clusters with Caribbean species and appears as sister to *P. rotundatum*.

Based on studies using morphology we propose that there is a subgroup of section *Mitranthes,* that we call the *Psidium amplexicaule* complex that includes all the above mentioned five species plus *P. albescens* Urb., *P. nannophyllum* Alain, *P. nummularia* (C. Wright ex Griseb.) C. Wright, *P. minutifolium* Krug & Urb., and the recently described *P. urquiolanum* Landrum & Z. Acosta. Species of the complex are restricted to the Greater Antilles, except for *P. amplexicaule,* which reaches coastal Bahia, Brazil. An estimate of ten species in this group is perhaps conservative as we have united as synonyms several species recognized by prior workers. Further studies may result in some of these being accepted as distinct. Species of the *P. amplexicaule* complex often have distributions restricted to only a portion of one island, so further exploration may reveal more.

**Description of *Psidium amplexicaule* complex**. Plants usually glabrous except for young growth and inner surface of calyx, the hairs about 0.1 mm long or less, appressed or erect. Leaves usually suborbicular or orbicular (Figs. 3A,5A), less often obovate, ovate, elliptic, oblanceolate, oblong-ovate, 0.5–8.7 cm long, 0.4–7.5 cm wide, 0.7–2.3 times as long as wide; apex generally rounded, sometimes emarginate, less often obtuse, acute, or abruptly acuminate; base mainly rounded, cordate or cuneate; venation often obscure, brochidodromous, the lateral veins 3–6 pairs, the marginal vein closely following the margin; tertiary veins when visible dendritic. Flower buds 3.5–7(–12) mm long; calyx closed or nearly closed in bud (Figs. 3B&C, 5C), often with a small apical pore through which minute hairs protrude, the inner surface of calyx moderately to densely covered with minute hairs, these usually reddish brown; petals 4 or 5; stamens 25–200(–270); anthers usually about 0.5 mm long when dry, with a terminal gland and 2 to several smaller glands below (Fig. 1C&D); style 2–7(–12) mm long; ovary 2–4-locular, the ovules borne on a peltate placenta, 4–30(–44) per locule (Figs. 1A&B,5G). Fruit subglobose, 5–20 mm long; seeds less than 20, 3–5(–7) mm long, with rounded and flat surfaces (Figs. 5H,9B).

Species of *Psidium* found in the Greater Antilles, but not belonging to the *P. amplexicaule* complex are usually widespread (*P. guajava, P. guineense, P. cattleyanum, P. oligospermum* [=*P. sartorianum*], *P. salutare*). Only *P. montanum*, endemic to Jamaica, is not found naturally outside of the Caribbean. As mentioned above, *P. salutare* may have hybridized with an endemic species, because in the study of Flickinger et al. (2020) the Cuban specimen appears as sister to *P. rotundatum*. There is some morphological evidence for this as the calyx tube is somewhat longer than in other areas and the tears between lobes are longer (Landrum 2003). Hybridization with a species with a closed calyx, typical of the *P. amplexicaule* complex, may have produced this morphology. Salywon (2003) found that *P. sintenisii* (which we consider a synonym of *P. oligospermum*) also appeared in his molecular studies closest to *P. amplexicaule* (Salywon 2003) and not *P. oligospermum* (using the name *P. sartorianum*). These two cases of molecular and morphological evidence not agreeing should be investigated more. It is perhaps significant that these are found on islands, where a species might arrive as a single plant. Hybridization might offer the best possibility for reproduction and/or the maintenance of genetic diversity.

*Psidium* of the Caribbean region is frequently confused with *Mosiera*, an apparently close relative. Landrum and Acosta (2023) have provided a key distinguishing these genera that we reproduce here with some modifications.

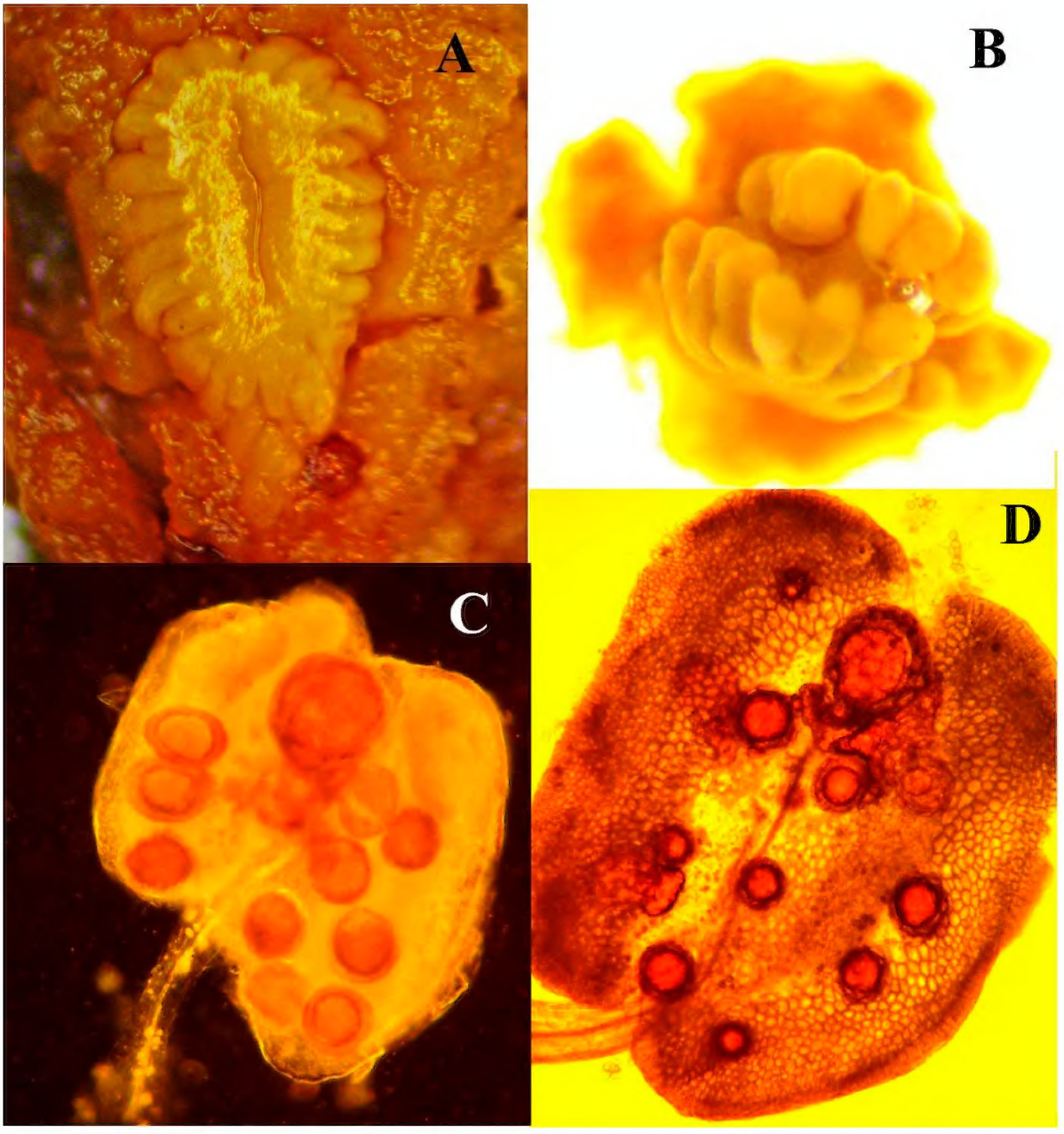


**Figure 1**. Placentas, ovules, and anthers of *Psidium parvifolium* (A & D) and *P. rotundatum* (B & C). **A**. Peltate placenta and ovules. **B**. Placentas of two locules with ovules viewed from base. **C**. & **D**. Anther showing terminal gland and smaller glands below. (A from *Acuña 12614*, US; B & C from *Bisse & Rojas 1980*, JE; D from *Bisse 16764*, JE).

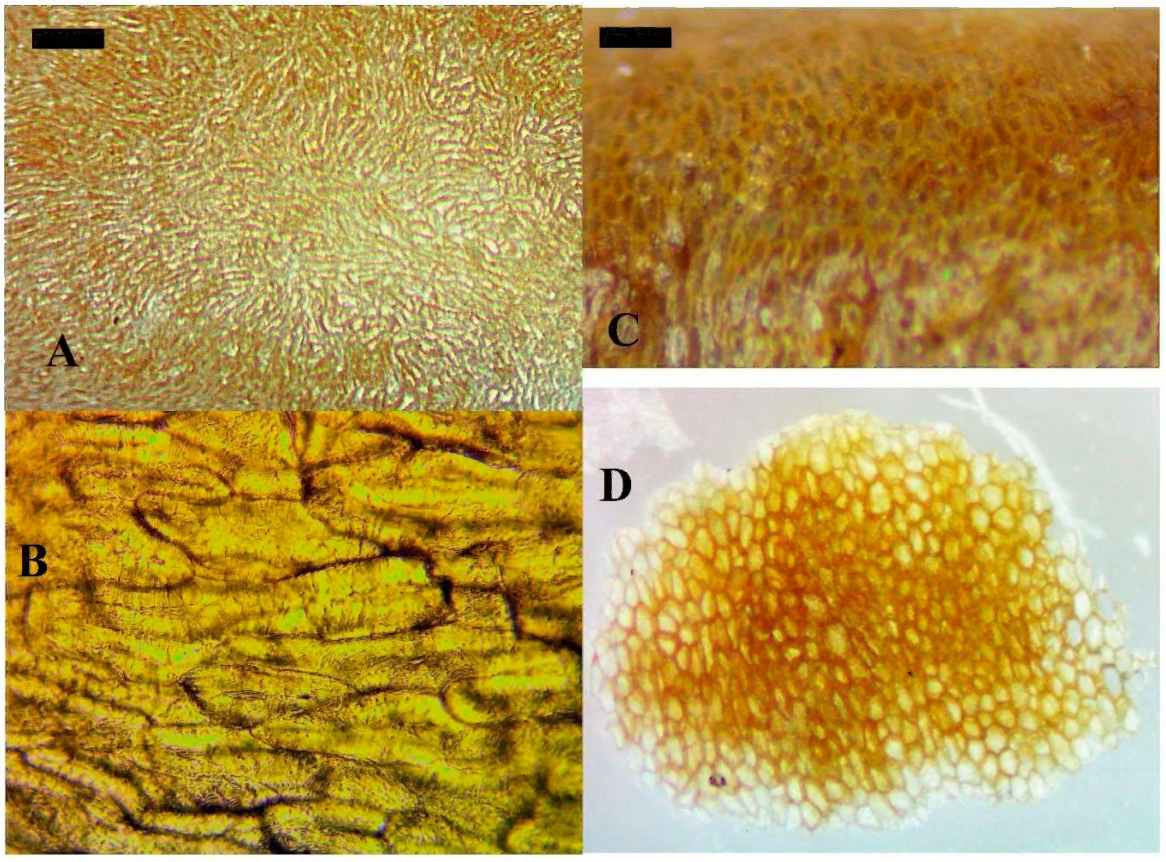


**Figure 2**. Seedcoats of *Psidium guineense* (A & B) and *Mosiera gracilipes* (C & D). **A**. Cleaned surface showing narrow, irregular cells. **B**. Tangential section of seedcoat showing thick-walled overlapping cells. **C**. Cell surface showing cells not overlapping, approximately round. **D**. Tangential section of seed coat showing round thin-walled cells. Bars in A and C ca. 0.1 mm long. (A & B from *Landrum 12046*, ASU; C & D from *Loigier 17138*, JBSD).

## Key distinguishing *Psidium* and *Mosiera*

1. Flowers pentamerous or tetramerous, the calyx closed in the bud or if open with 5 more or less distinct lobes; seed surface dull to rough, not lustrous, covered with a thin layer of pulpy tissue (apparently endocarp) when wet or a glaze or crusty layer when dry, the cleaned surface with cells narrow, overlapping, not forming a mosaic pattern (Fig. 2A&B), the seed coat (5–) 8–30 cells thick at narrowest point; anthers with a terminal gland and usually with a few to several glands in the connective below; peduncles uniflorous or sometimes bearing a 3-flowered dichasium, or sometimes borne on bracteate shoots (racemes), but not normally appearing as pairs on very short axillary shoots; tertiary veins between lateral veins when visible forming a ladder-like (e.g., *P. guajava,* Fig. 7A) or dendritic pattern (e.g., *P. salutare*, Fig. 14A)....***Psidium***

1' Flowers tetramerous, the calyx with 4 distinct lobes; seed coat smooth, lustrous with surface cells forming a mosaic pattern (Fig. 2C&D), or leathery-verrucose, 1–6(–10) cells thick; anthers usually with a single terminal gland in the connective; peduncles uniflorous, solitary or borne in pairs at a node on a very short axillary shoot; tertiary veins between lateral veins if visible usually forming a reticulate, web-like pattern..... ***Mosiera***

## The Genus *Psidium* in the Greater Antilles

See Landrum (2022) for generic description and list of synonyms.

The following key is for the species of *Psidium* growing naturally (outside of cultivation) in the Greater Antilles. Cultivated species included in the key, because they have dispersed and thrive in uncultivated areas, are *P. cattleyanum* and *P. guajava*. *Psidium montanum*, native in Jamaica may also be cultivated. *Psidium friedrichsthalianum* (O. Berg) Nied. of continental Mesoamerica and South America is cultivated in Cuba. A closely related continental species, *P. acidum* (DC.) Landrum has also been reported in Cuba (Trujillo Sánchez et al. 2018), but we suspect that the plant in that paper is *P. friedrichsthalianum*, which the authors have misidentified. These two species are directly compared in a key in Landrum (2016).

### Key to the species of *Psidium* growing naturally in the Greater Antilles

1. Calyx open before anthesis, with 5 distinguishable lobes in flower bud and after anthesis, the closed corolla clearly visible before the bud opens; leaves mainly elliptic to lanceolate, mainly 2–5 cm long, 1.5–3 times as long as wide; lateral veins 5–13; usually a low subshrub ..... ***P. salutare***

1' Calyx closed or with a small apical pore in flower bud, the lobes if any scarcely distinguishable in flower bud, the corolla usually hidden in the closed flower bud; calyx after anthesis often with only 4 distinguishable lobes; leaves various, often longer than 5 cm and/or less than 1.5 times as long as wide; lateral veins various, often less than 5; shrubs to trees.

2. Flower buds 3–9 mm long just before anthesis; style 2–7 mm long; leaves 1–8(–10) cm long; leaves often less than 1.5 times as long as wide.

3. Leaves mainly 0.5–2 cm long, 0.4–1.5 cm wide; lateral veins often obscure (except sometimes in *P. acranthum*, which appears again below).

4. Leaves elliptic to obovate, 1–2 times as long as wide, the apex acute to obtuse; peduncles 1–1.8 cm long, about as long or longer than the leaves; eastern Cuba..... ***P. minutifolium***

4' Leaves orbicular to ovate, 0.7–1.4 times as long as wide, the apex rounded to abruptly acuminate; peduncles generally shorter than the leaves; western Cuba and Hispaniola.

5. Leaves usually less than 1 cm long and wide, nearly sessile and appearing crowded on twigs; leaf apex often abruptly acuminate; stamens up to ca. 30; Hispaniola..... ***P. nannophyllum***

5' Leaves often more than 1 cm long and wide, sessile to petiolate, usually not appearing crowded on twigs; leaf apex usually acute to rounded, rarely abruptly acuminate; stamens usually more than 80; Cuba and Hispaniola.

6. Leaves often lustrous above, the lateral veins often clearly visible; young twigs usually square in cross section or with 4 weak wings; stamens usually over 100; ovules per locule usually over 20; Hispaniola ..... ***P. acranthum***

6' Leaves usually dull above, the lateral veins indistinct or faint; young twigs terete to compressed, without 4 wings; stamens usually under 100; ovules per locules less than 20; Cuba..... ***P. nummularia***

3' Leaves mainly 1–8 cm long, 1.5–7 mm wide; lateral veins clearly visible (except in *P. urquiolanum*).

7. Laterals veins 3–4 pairs, mostly departing from midvein below mid-leaf, the distal laterals nearly equaling the midvein, the midvein sometimes appearing to terminate in two lateral veins; Jamaica..... ***P. albescens***

7' Lateral 4–10 pairs, departing from midvein above and below mid-leaf, the distal laterals weaker than the midvein.

8. Leaves lanceolate to elliptic, usually widest at mid-leaf or below, mostly 2–4 times as long as wide; apex obtuse, acute, to acuminate; base acute to acuminate; petiole mostly 3–4 mm long. ..... ***P. oligospermum***

8' Leaves suborbicular, obovate, oblanceolate, or elliptic, usually widest at mid-leaf or above, mostly less than 2 times as long as wide; apex mostly rounded to obtuse; base various, often rounded to cordate; petiole often 0–2 mm long (up to 14 mm long in *P. cattleyanum*).

9. Lateral veins 8–13 pairs; petiole often over 4 mm long; apex usually acute to acuminate, less often broadly rounded; inner surface of calyx glabrous to puberulent, the hairs not reddish brown. ..... ***P. cattleyanum***

9' Lateral veins often obscure, when visible 4–6(–8) pairs; petiole 0–4 mm long; apex usually rounded to obtuse; inner surface of calyx usually covered with minute reddish brown hairs.

10. Leaves mainly obovate to oblanceolate, 1–2.2 times as long as wide, the base acute, acuminate, or cuneate; peduncle 6–32 mm long; Cuba..... ***P. parvifolium***

10' Leaves mainly orbicular to ovate (sometimes obovate to oblanceolate in *P. urquiolanum*), 0.9–1.8 times as long as wide, the base rounded, cordate, truncate (sometimes broadly cuneate in *P. amplexicaule* of Hispaniola); peduncle frequently less than 6 mm long and rarely over 20 mm long.

11. Flower buds 6–12 mm long; peduncle 1–1.5 mm wide; style 6–12 mm long; stamens 150–270; anthers about 0.8–1 mm long; widespread in islands of Caribbean to the coast of northern Brazil..... ***P. amplexicaule***

11' Flower buds 3–7 mm long; peduncle 0.3–1 mm wide; style 2–7 mm long; stamens 35–150(–170); anthers 0.5–0.8 mm long.

12. Leaves elliptic, oblong, obovate, oblanceolate, mainly 1.5–2.3 times as long as wide; petiole 2–4 mm long; eastern Cuba..... ***P. urquiolanum***

12' Leaves orbicular broadly elliptic, to ovate, mainly 0.7–1.5 times as long as wide; petiole 0–2 mm long; western and central Cuba, Jamaica, Hispaniola.

13. Leaves mainly less than 3 cm long and wide; stamens 120–170, the anthers ca. 0.8 mm long; ovules per locule 22–29; Hispaniola..... ***P. acranthum***

13' Leaves mostly over 5 cm long and wide; stamens 35–125, the anthers ca. 0.5 mm long; ovules per locule 4–19; Jamaica and Cuba.

14. Flower bud 3.5–4 mm long; style 2–3 mm long; stamens 35–47; leaves 2–8 cm long; peduncle 1-flowered, 3–8 mm long; Jamaica... ***P. harrisianum***

14' Flower bud 4–6 mm long; style 5–6 mm long; stamens 85–125; leaves 1.7–5.5 cm long; peduncle 1–3-flowered, 4–18 mm long; Cuba..... ***P. rotundatum***

2' Flower buds generally over 10 mm long just before anthesis; style often over 10 mm long; leaves 4–14 cm long, mostly 1.5–3 times as long as wide.

15. Twigs and flower buds pubescent; lateral veins 5–22 pairs; tertiary veins usually ladder-like between laterals.

16. Lateral veins usually 9–22 pairs; young twigs quadrangular, more or less winged; hairs of lower leaf surface appressed, whitish, yellowish, or silvery; calyx usually tearing into 2 or 3 parts; anthers 0.7–1 mm long, usually with fewer than 10 glands..... ***P. guajava***

16' Lateral veins 5–10(–12) pairs; young twigs more or less terete or compressed (some vigorous shoots sometimes 4–winged); hairs of lower leaf surface more or less erect, reddish brown, or appressed, whitish or grayish; calyx usually tearing into 4 or 5 parts; anthers 1–3 mm long, often with more than 10 glands. ..... ***P. guineense***

15' Twigs and flower buds glabrous or minutely and obscurely puberulent/hirtellus; lateral veins 3–12 pairs; tertiary veins dendritic.

17. Leaves elliptic to lanceolate, mostly 2–3.3 times as long as wide; young twigs frequently 4-ridged or winged in cross section; flower bud usually with an acuminate tip; Jamaica. ..... ***P. montanum***

17' Leaves obovate, oblanceolate to orbicular (less often elliptic), 0.9–2(–2.6) times as long as wide; twigs more or less terete in cross section; flower bud with a rounded to acute tip; widespread.

18. Leaves obovate, oblanceolate, less often elliptic, the petiole 2–14 mm long; lateral veins 8–13 pairs; petals 3–6 mm long; frequently cultivated, sometimes naturalized ..... ***P. cattleyanum***

18' Leaves suborbicular to obovate, sessile, or nearly so, the petiole up to ca. 2 mm long; lateral veins 3–8 pairs; petals up to 15 mm long; native.

19. Leaves mainly orbicular to suborbicular (sometimes obovate in Hispaniola), sessile or subsessile, the petiole 0–2 mm long; base rounded to cordate (sometimes broadly cuneate in

Hispaniola); lateral veins leaving midvein at 60–90 degree angle; stamens 150–270, ca. 1 mm long; style 6–12 mm long; widespread ..... ***P. amplexicaule***
19' Leaves mainly obovate to suborbicular, petiolate, the petiole 1–6 mm long; base acute to acuminate; lateral veins leaving midvein at 20–60(–90) degree angle; stamens probably less than 150, ca. 0.5 mm long; style 5-6 mm long; Jamaica..... ***P. albescens***

1. ***Psidium acranthum*** Urb., Repert. Spec. Nov. Regni Veg. 18: 367. 1922. TYPE. DOMINICAN REPUBLIC. **El Seibo**: San Lorenzo Bay and vicinity, (19.01°N, 69.16°W), south coast of Samana Bay, 5 m, 5–10 April 1921 (fl), *Abbott 1247* (HOLOTYPE: B, lost; ISOTYPES: F-65685, GH-71234, MO!, NY-1365099!, US-117653!).

***Psidium trilobum*** Urb. & Ekman, Ark. Bot. 22A(10): 20. 1929. TYPE. HAITI. **Nord**: Massif du Morne, Gros-Morne, ad Morne Bonpère, (19.5°N, 72.25°W), 500–600 m, 23 June 1927 (fl), *Ekman H8521* (HOLOTYPE: B, lost; ISOTYPES: MICH!, S-R-9432 ["typus"], S-12-20646, US-117679!, US!), same locality, 30 Sep 1925 (st), *Ekman H4963* (PARATYPE: B, lost; ISOPARATYPES: K-565281, MICH!, NY!, US!).

***Psidium hotteanum*** Urb. & Ekman, Ark. Bot. 22A(10): 21. 1929. TYPE. HAITI. **Gran'Anse**: Massif de la Hotte....prope Petit-Goave ad viam ad Morne Calumette, (18.4°N, 74°W), ca. 1100 m, 26 Nov 1926 (buds), *Ekman H7308*, (HOLOTYPE: B, lost; ISOTYPES: G-227701!, GH-71243, K-565283, NY!, S-R-8906, S-12-20581, US-117664!).

***Psidium haitiense*** Alain, Brittonia 20: 159. 1968. TYPE. HAITI. **Sud-Est**: Boucan Chat, Morne des Commissaires, (18.33°N, 71.77°W), 9 Nov 1944, *Holdridge 1958* (HOLOTYPE: NY-1288053!; ISOTYPES: GH-71242, MO!, US-117662!, US!).

***Psidium brevifolium*** Alain, Moscosoa 1: 33. 1976. TYPE. DOMINICAN REPUBLIC. La Cueva, La Horma Arriba, San José de Ocoa (18.650°N, 70.540°W), 1400 m, 3 Jan 1974, *Liogier 20940* (HOLOTYPE: JBSD ["SDM']; ISOTYPE: NY-1288036!).

Shrub or small tree 1.5–6 m high, essentially glabrous or minutely hispid on young growth; *hairs* mainly less than 0.1 mm long, reddish brown; *young twigs* reddish brown, glabrous to minutely hispid, square to terete in cross section, the bark of older twigs becoming gray, smooth to longitudinally cracked, with triangular to ovate bud scales sometimes persisting, these ca. 1 mm long at proximal nodes of twigs. LEAVES orbicular, suborbicular, to obovate or ovate, (0.7–)1–3(–3.6) cm long, 1–2.7(–3.4) mm wide, 0.7–1.4 times as long as wide; *apex* rounded, emarginate, to abruptly acuminate; *base* rounded, acuminate, subcordate, or cordate; *petiole* essentially none to ca. 2 mm long, ca. 1 mm wide; *venation* brochidodromous, obscure or with 4–6 lateral veins visible, leaving the midvein at an angle of 45 to nearly 90 degrees, a marginal vein if visible arching between the laterals, running about 1–2 mm from the margin, with dendritic tertiary veins sometimes visible between the laterals, appearing to arise from the marginal vein; *blades* coriaceous to subcoriaceous, strongly glandular, dull to lustrous above, dull below, the margin slightly to strongly revolute. FLOWER BUDS pyriform to pyriform-cylindric, 3–6 mm long; hypanthium obconic to cylindric, 1–2.5 mm long; *indumentum pattern of buds* with all external surfaces glabrous to minutely hispid, the inner surface of calyx and staminal ring minutely hispid; *peduncles* flattened, 2–9 mm long, 0.5–1 mm wide; *bracteoles* narrowly triangular, 0.5–1.5 mm long. CALYX closed or with a terminal pore in bud, tearing irregularly, usually in 3 or 4 parts, persisting until fruit matures, the tears sometimes cutting the staminal ring; *petals* 5, 5–8 mm long; *disk* within staminal ring, 2–3 mm across; *stamens* 120–170, 4–5 mm long; *anthers* ca. 0.8 mm long, with a terminal gland and 2–6 smaller glands below; *style* 4–7 mm long, glabrous or with scattered hairs; *ovary* 2–3-locular; *ovules* (15–)22–29 per locule, borne on the edge of a peltate placenta, reflexed, 1–2-seriate along the edge of the lamellae of the placenta. FRUIT subglobose, 1– 2 cm long, the fruit wall 1–4 mm thick; *seeds* up to ca. 5, 4–6 mm long, globose to subreniform, with rounded and flat sides. (Fig. 3.)

**Representative specimens. DOMINICAN REPUBLIC**. **El Seibo**: entre La Cueva de Arena y la Boca del Infierno, orilla del sur de la Bahia de Samaná (19.08°N, 69.45°W), 0 m, 25 Apr 1985 (fl), *Zanoni 34385* (ASU0004813, NY). **Monte Plata:** Los Haitises, Pilancón, Bayaguana (18.89°N, 69.64°W), 200 m, 25 Apr 1973 (st), *Liogier 18963* (JBSD, NY, US). **Independencia**: Sierra de Bahoruco, 12 km al S de Duvergé, en el lugar llamado Monte Palma (18.26°N, 71.5°W), 860 m, 24 Mar 1993 (fl), *García 4447* (ASU0069454); Jimani, (18.49°N, 71.85°W), 25 Jul 1985 (fl), *Grifo 204* (ASU0004812); Charco de la Paloma, 37.4 km al sur de Puerto Escondido (18.2°N, 71.5°W), 1810 m, 19 Mar 1985 (fr), *Zanoni 33920* (JBSD). **Samaná**: Peninsula de Samaná, slope of Pan de Azucar (19.260°N, 69.300°W), 4 May 1930 (st), *Ekman 14658* (MICH).

**Phenology**—Flowering in March to July, and November; fruiting in January and March.

**Habitat and distribution**—Endemic to Hispaniola; forest to open areas, from sea level to 2000 m, often on limestone.

**Distinguishing features**— Leaves orbicular, suborbicular, to obovate or ovate, mainly 1–3 cm long; young twigs 4-angled to weakly 4-winged; Hispaniola.

As understood here, *Psidium acranthum* is a somewhat variable species from a wide range of elevations and habitats. Some populations seem to be known from single specimens, and these specimens are often the types of taxa here considered synonyms. As with any species of the *P. amplexicaule* complex, new collections, with more information on, for example, habitat, phenology, and fruit characteristics, may change the taxonomic views in the future.

**2. *Psidium albescens*** Urb., Symb. Antill. (Urban). 5(3): 441. 1908. TYPE. Jamaica. "in latere australi Long Mountain" [ca. 17°59'N, 76°44'W], 300 m, 21 Jun 1907 (fl), *Harris 9583* (HOLOTYPE: B, lost; ISOTYPES: A-71235, BM-796866 [lower part of sheet], K-565288, NY-1365100!).

Shrub or small tree 2–5 m high, glabrous except for minutely strigose to puberulent inner surface of calyx and staminal ring, the trunk pale, smooth; *hairs* reddish brown to whitish, less than 0.1 mm long; *young twigs* light reddish brown, the bark becoming whitish to gray, remaining smooth, or exfoliating in thin flakes. LEAVES obovate, suborbicular, or less often ovate, 1.8–6 cm long, 1.4–4 cm wide, 1.3–1.7 times as wide as long; *apex* rounded; *base* acuminate to acute, gradually intergrading into petiole; *petiole* 1–6 mm long, 0.8–2 mm wide; *venation* prominent to obscure, more visible above than below, raised slightly above and below, brochidodromous, with 3–4 pairs of laterals, leaving the midvein at an angle of 30–45 degrees (or less), mostly departing from midvein below mid-leaf, the distal laterals nearly equaling the midvein, the midvein sometimes appearing to terminate in two lateral veins, the marginal veins arching between the lateral, mostly within 1–3 mm of the margin, the tertiary veins dendritic, appearing to arise from the marginal vein; *blades* lustrous or not above, dull below, drying yellowish or greenish brown, the margin slightly revolute. FLOWER BUDS pyriform, 10 mm long when mature, densely glandular; hypanthium obconic to narrowly campanulate, ca. 3 mm long; *indumentum pattern of buds* with all surfaces glabrous except for strigose to puberulent inner surface of calyx and staminal ring; *peduncles* 4–12 mm long (to ca. 30 mm long in fruit), 0.8–1 mm wide, terete; *bracteoles* narrowly triangular, ca. 1 mm long, deciduous before anthesis. CALYX closed or with a minute apical pore through which hairs protrude in flower bud, tearing irregularly in 2 or 3 parts; *petals* ca. 7 mm long, glabrous, strongly glandular; *disk* within staminal ring, probably 1–2 mm across; *stamens* ca. 115, ca. 4 mm long; *anthers* globose, ca. 0.5 mm long, with a terminal gland and 0–4 smaller glands below; *style* 5–6 mm long; *ovary* 3-locular; *ovules* 22–28, borne on the edges of a somewhat peltate placenta, 1–2-seriate on each lamella. FRUIT subglobose to pyriform, ca 1 cm long and wide; *seeds* suborbicular, flattened, with rounded and flat sides, ca. 4 mm across. (Fig. 4).

**Representative specimens. JAMAICA**. **Manchester:** Somerset Woods, ca. 5 miles NW of Mandeville, (18.07°N, 77.55°W), 24 Feb 1957 (fl), *Proctor 16177* (IJ). **Portland**: East slope of John Crow Mountains, 1.5–2.5 mi SW of Ecclesdown, (18.03°N, 76.36°W), 17 Jun 1959 (fl), *Proctor 19727* (IJ, MICH). **St. Andrew**: Long Mountain, rd. to Wareika [`Wareka`], (17.98°N, 76.75°W), 183 m, 19 Nov 1907 (fl), *Harris 9998* (BM, NY).

**Phenology**—Flowering in June and November; fruiting in September.

**Habitat and distribution**—Endemic to Jamaica, known from only three localities, one of which is from near the city of Kingston, the collections being made in 1907. This species is in critical need of a conservation assessment.

**Distinguishing features**—*Psidium albescens* could be confused with Jamaican populations of *P. amplexicale* or *P. harrisianum*, both of which have nearly orbicular, nearly sessile leaves, often over 6 cm long. In *P. albescens* the leaves are usually obovate, usually less than 6 cm long, with a petiole 1–6 mm long. Furthermore *P. albescens* differs in having the leaf base acute to acuminate and the lateral veins often leaving midvein at an angle of less than 45 degrees (45-90 degrees in *P. amplexicaule* and *P. harrisianum*).

**3. *Psidium amplexicaule*** Persoon, Syn. 2: 27. 1806. TYPE. [St. John's], "Antillis." *Richard s.n.* (HOLOTYPE: P [Jussieu herbarium], =MICH neg. 1965, =ASU photo; ISOTYPES: F-76377!, P-258489!, P-258490!) Other possible original material at P, P-258491! [perhaps from Tortola], P-258492! from Guadeloupe (ca. 16.24°N, 61.5°W).

***Psidium cordatum*** Sims, Bot. Mag. 43: t. 1779. 1815. TYPE. "Communicated by A. B. Lambert, Esq. from his collection at Boyton, who raised it from seeds received from late James Tobin, Esq. the produce of a tree in the Island of St. Nevis (ca. 17.35°N, 62.8°W), in the West-Indies." (HOLOTYPE: K-170084).

***Psidium dictyophyllum*** Urb. & Ekman, Ark. Bot. 21A(5): 19. 1927. TYPE. Haiti, "Ile la Tortue, rough limestone west of Mouillage Anglais", 22 May 1925, *Ekman H4098* (SYNTYPES: S-R-9438, S-12-20560).

***Guajava amplexicaulis*** (Persoon) Kuntze, Rev. Gen. 1: 240. 1891.

***Psidium dumetorum*** Proctor, Bull. Inst. Jam. Sci. Ser. no. 16: 37. 1967. TYPE. Jamaica, Clarendon, Mason River Savanna, 2.75–3 mi due NW of Kellits P. O., 2300 ft, 16 Apr 1959 (fl), *Proctor 19650* (HOLOTYPE: IJ!, =photo at ASU; ISOTYPE:TEX-ll00372190!, MO!).

***Psidium sessilifolium*** Alain, Phytologia 25(5): 270. 1973. TYPE. Dominican Republic, "Arroyo Frances, Puerto Plata, 50–100 m," 28–29 Oct 1969, *Liogier 16557* (HOLOTYPE: NY-1288089!; ISOTYPES: MICH!, US!). PARATYPES. *Liogier 15877* (PARATYPE: NY!; ISOPARATYPES: MICH!, US!); *Liogier 16145* (PARATYPE: NY!; ISOPARATYPES: BM!, MICH!, US!); *Liogier 16473* (PARATYPE: NY!; ISOPARATYPE: MICH!, US!).

***Calyptrogenia biflora*** Alain, Moscosoa 1(1): 28. 1976. TYPE. Dominican Republic, Sierra Prieta, Villa Mella, 150 m, *Liogier & Liogier 21467* (SYNTYPES: ["SDM"] JBSD, NY-84484; ISOSYNTYPE: GH-68944).

***Marlierea leal-costae*** G. M. Barroso & Peixoto, Revista Brasil. Bot. 18(1): 105. 1995. TYPE. Brazil, Bahia, Salvador, Dunas de Itapoá, entre o aeroporto e Stella Maris, 20 Oct 1974, *Leal Costa & Santana s.n.* (HOLOTYPE: ALCB 03038, not seen online). Paratype from type locality [marked as "Holotype" and including diagnostic illustrations], 30 Nov 1969, *Leal Costa 37* viewed as an online image SpeciesLink; photo at ASU.

Shrub 1–2 m high, glabrous except for puberulent disk and calyx within, strongly glandular on young growth; *hairs* minute (less than 0.1 mm long), reddish brown to white; *young twigs* reddish to gray, smooth or longitudinally striate. LEAVES suborbicular, oblong, elliptic, ovate, or obovate, 2.4–7.5 cm long, 2–7.5 cm wide, 0.9–1.8 times as long as wide, glabrous; *apex* rounded, or obtuse, often emarginate; *base* rounded, cordate, or broadly cuneate; *petiole* essentially none, or 1–2 mm long, glabrous; *venation* brochidodromous, the midvein flat above, prominent below, the lateral veins 5–8 pairs, leaving the midvein at an angle of 60° to nearly 90°, moderately prominent to obscure, straight or somewhat recurved, the marginal vein broadly arching between the laterals, within 1–7 mm of the margin, the tertiary veins dendritic, usually

appearing to arise from the marginals, alternating with the laterals; *blades* coriaceous, drying gray-green to dark reddish brown, slightly lighter below than above, lustrous above. FLOWER BUDS pyriform, 6–12 mm long, glabrous, the hypanthium obconic, cylindrical or campanulate, 3–5 mm long, the distal portion of bud subglobose to obovoid, 4–9 mm long; *indumentum pattern of buds* with all surfaces glabrous or the disk and/or calyx within minutely (usually appressed) puberulent; *peduncles* 1–3-flowered, solitary, borne in the axils of leaves, 5–25 mm long, terete, subterete, or sometimes flattened distally, 1–1.5 mm wide, glabrous; *bracteoles* linear to narrowly triangular, ca. 0.5–1.2 mm long. CALYX closed entirely, sometimes with an apiculate apex, or enclosing the corolla except for an apical pore, tearing irregularly at anthesis, puberulent within, the tears cutting deeply into the staminal ring; *petals* 5, suborbicular to elliptic, (3–)9–15 mm long, sometime unequal in size; *stamens* 150–270, 8–10 mm long; *anthers* 0.8–1 mm long, with a large terminal gland and 2–22 smaller glands below; *style* 6–12 mm long, glabrous; *ovary* 2–4-locular; *ovules* 15–44 per locule, 1–2 seriate on edge of a peltate placenta. FRUIT subglobose, 1–2 cm in diam.; *seeds* (1–)6–16, 4–7 mm long, with some flat surfaces, sometimes lustrous; fruit wall 1.5–2 mm thick. (Fig. 5).

**Representative specimens. BRAZIL**. **Bahia**: Salvador, ca. 30 km a N do centro da cidade, estrada para o aeroporto, arredores de Itapua, (12.97°S, 38.51°W), 23 May 1981 (fl), *de Carvalho 707* (CEPEC, NY); Camaçari, após a Tibrás, (12.80°S, 38.20°W), 12 Sep 1992 (fl), *Guedes* (ALCB, ASU0005189, CEPEC); Salvador, 3 km de la ciudad de Salvador, al oeste del aeropuerto, (12.97°S, 38.51°W), 12 Nov 1983 (fl), *Callejas Posada 1733* (CEPEC, NY). **Sergipe**: Pirambu, (10.68°S, 36.87°W), 14 Sep 1995 (fr), *Landim 607* (ASU0005190).

**DOMINICAN REPUBLIC**. **Dajabon**: Partido, along Maguaca River, (19.48°N, 71.55°W), 28 Aug 1971 (fr), [paratype of *Psidium sessilifolium*] *Liogier 17385* (NY). **Distrito Nacional**: Sierra Prieta, Villa Mella, (18.65°N, 69.97°W), 80 m, 16 Apr 1996 (yfr), *Veloz 814* (ASU0069447). **Espaillat**: Gaspar Hernández, La Hermita, road 5, 6 km from Gaspar Hernández to San Juan, (19.63°N, 70.23°W), 70 m, 1 Jun 2000 (fl), *Araujo 1800* (ASU0060535). **Puerto Plata**: Paraje la Isla, en la carretera a Guzmancito el Albinal, (19.87°N, 70.81°W), 2 m, 4 Aug 2002 (fr), *Salywon 1322* (ASU0069449). **Santiago Rodríguez**: Monción, Cordillera Central, 3.6 km al sureste de Jicomé, camino a Los Ramones, (19.32°N, 71.17°W), 16 Jul 1985 (fr), *Mejía 1430* (ASU0004805).

**HAITI. Nord-Oueste:** Ile la Tortue, Rivière la Vallée, Morne Barranca, (20.06°N, 72.80°W), 300 m, 24 May 1925 (fl), *Ekman H4112* [similar to the type of *Psidium dictyophyllum*] (JBSD, MICH, US); vicinity of Port-de-Paix, bluff west of rifle range, (19.93°N, 72.84°W), 25 Jan 1929 (fl), *Leonard 12354* (NY, US). **Ouest:** Valle Artibonte, Dept. Artibonte, 9.3km al NO de La Chapelle, (18.80°N, 72.37°W), 12 Jun 1986 (st), *Zanoni 35199* (ASU0004807). Nord-Ouest: 5.5 km al nordeste de Mole St. Nicolas en la carretera costera Jean-Rabel, (19.83°N, 73.35°W), 3 Feb 1985 (fl & fr), *Zanoni 33501* (ASU0004815).

**JAMAICA**. **Clarendon**: Mason River Savanna, 2–3 mi due NW of Kellits P. O., 2300 ft, 20 Nov 1958 (fl), *Proctor 18402* (IJ).

**PUERTO RICO**. Utuado, Barrio Ángeles, El Cemí on summit, (18.27°N, 66.70°W), 400 m, 4 Aug 1981, *Liogier 32103* (NY); Florida, Barrio Florida Adentro, km 50.75, Rte 140, (18.34°N, 66.59°W), 150 m, 10 Aug 2001 (fr), *Salywon 1210* (ASU0004804).

**VIRGIN ISLANDS (UK)**. Tortola, Sage Mountain National Park, (18.40°N, 64.66°W), 488 m, 15 Mar 1972 (fr), *Little 26062* (NY, US); Virgin Gorda Peak, Virgin Gorda N. P., (18.49°N, 64.40°W), 305 m, 17 Mar 1972 (fl), *Little 26120* (NY, US).

**VIRGIN ISLANDS (USA).** Saint John, Coral Bay Quarter, Bordeaux Mountains Road, (18.35°N, 64.71°W), 8 Aug 1985 (yfr), *Acevedo 273* (ASU0004809).

**Phenology**—Flowering from January to June; fruiting mainly in August.

**Habitat and Distribution**—Apparently widespread in the Caribbean islands and disjunct along the coast of Bahia, Sergipe and perhaps others states of Brazil. In Brazil apparently found only in "restinga" (sandy coastal habitats) near sea level. In the Caribbean often growing well away from coast along streams and other humid habitats and on hills, on limestone, serpentine, or laterite soils, at elevations near sea level to 450 m.

**Distinguishing Features**—An essentially glabrous shrub 1–2 m high; leaves 2.4–7.5 cm long, suborbicular to oblong, 0.9–1.8 times as long as wide, sessile, or subsessile, the base rounded to cordate; lateral veins leaving the midvein at an angle of 60° to nearly 90°; flower buds pyriform, 6–12 mm long anthers with a terminal gland and smaller glands below; seeds 4–7 mm long.

**4. *Psidium cattleyanum*** Sabine, Trans. Roy. Hort. Soc. 4: 315. pl. 11. 1821. TYPE. Raised in England by William Cattley from seed from China. *Illustration: Trans. Roy. Hort. Soc. 4: 315. pl. 11. 1821.* (LECTOTYPE: Illustration of Sabine, plate 11, designated by Snow & Veldcamp 2010 and again by Tuler et al. 2018).

See extensive synonymy in Landrum 2022.

Shrub or tree to 1–12 m high, glabrous or the young growth puberulent to strigose on some floral structures; *hairs* whitish, most less than 0.1 mm long; *young twigs* flattened, becoming subterete, light reddish brown to light gray, the older twigs remaining more or less smooth, usually gray. LEAVES obovate, oblanceolate, elliptic, 3–10.5 cm long, 1.5–6.5 cm wide, 1.5–2.6 times as long as wide; *apex* acute, acuminate, to broadly rounded; *base* acuminate to cuneate, or rarely rounded; *petiole* channeled, 2–14 mm long, 1–2 mm wide; *venation* brochidodromous, the midvein prominent below, nearly flat to shallowly impressed above, the lateral veins 6–13 pairs, leaving the midvein at an angle of 45–60°, prominent to weak, flat or impressed above, the marginal vein arching between the laterals 1–5 mm from the margin, somewhat weaker than laterals, the tertiary veins dendritic, arising near the margin and extending towards the midvein; *blades* coriaceous (rubbery when fresh), drying light or dark reddish brown to gray-green, nearly concolorous, the upper surface after drying often mottled with whitish blotches, the margin slightly revolute. FLOWER BUD subpyriform, 5–14 mm long, the hypanthium obconic to funnel-form, 2–5 mm long, the distal portion of bud subglobose, 3–10 mm long; *indumentum pattern of buds* with all surfaces glabrous or with peduncles, bracteoles, and calyx within sometimes puberulent; *peduncles* 2–8(–13) mm long, ca. 1 mm wide, uniflorous, borne in the axils of leaves, at leafless nodes, or in the axils of leafy to reduced bracts; *bracteoles* ovate, lanceolate, or oblong, 1–2.3 mm long, caducous at anthesis. CALYX fused 3–7 mm beyond the ovary summit, terminating in a sinuate edged terminal pore or in 5 broadly rounded lobes (rarely closed and falling as a calyptra above staminal ring), tearing irregularly or between the lobes at anthesis, the tears cutting through the staminal ring; *petals* suborbicular, obovate to elliptic, 3–8 mm long; *disk* within the staminal ring ca. 4–6 mm across; *stamens* 200–400, 3–8 mm long; *anthers* 0.6–1 mm long, with 1 terminal gland; *style* 4–8 mm long, the stigma 1–1.5 mm wide; *ovary* 3–5-locular, sometimes with a few hairs on inside of locules; *ovules* 10–28 per locule, uniseriate or biseriate on each lamella, the placenta peltate, at least slightly so. FRUIT red or yellow, pyriform to subglobose, 1.5–3 cm long; *seeds* 12–64, 2–6 mm long, smooth, with rounded edges. 2*n* commonly equal to 44, 66, 88 and higher. (Fig. 6).

**Representative specimen. JAMAICA**. **Clarendon**: Mason River Field Station, ca. 3 mi NW of Kellits (ca. 18°10'N, 77°14'W), ca. 650 m, 5 Jun1983 (fl), *Landrum 4763* (NY). **Manchester**: Marshalls Pen, 2.25 mi due NW of Mandeville, (18.06°N, 77.53°W), 701 m, 4 Oct 1964 (fr), *Proctor 25580* (IJ). **St. Ann**, road to Holly Mount, (18.21°N, 77.12°W), 21Sep 1962 (fr), *Adams 11677* (MO).

**Phenology—**Probably flowering in rainy season (summer months of May to August).

**Habitat and Distribution—** Frequently cultivated in tropical and subtropical regions around the world; likely cultivated on all the Greater Antilles; often invasive, especially in disturbed habitats. Growing uncultivated in at least Jamaica.

**Distinguishing Features—**Plants nearly glabrous, the leaves rubbery coriaceous, usually obovate to oblanceolate; calyx usually with a terminal pore, tearing irregularly on opening (rarely closed and calyptrate above the staminal ring), the tears cutting into the staminal ring.

*Psidium cattleyanum* is a variable species with respect to leaf and fruit size, fruit color, and ploidy level. Chromosome numbers of $2n$=44 and 88 have previously been reported. Machado (2016) reports polyploidy levels as low as 2n=3x=33 and as high as 2n=12x=132 with little correlation to geography or fruit color, except that higher ploidy levels may be associated with more adverse habitats. Machado also reports that individuals with red fruits tend to grow at higher elevations than those with yellow fruits. The species can be an aggressive invader in some areas such as Hawaii and Madagascar but is also valued for its edible fruits and its use in landscaping.

**5. *Psidium guajava*** L., Sp. Pl. 470. 1753. TYPE. "Habitat in India," cultivated plant from Hort. Cliff. (LECTOTYPE: BM-628598 [designated by McVaugh, 1989]).

See extensive synonymy in Landrum 2022.

Shrub or tree up to ca. 12 m high, subglabrous to densely appressed pubescent on young growth and lower leaf surfaces, the trunk smooth, light brown to light gray-green, with large flaky scales; *hairs* whitish, yellowish, or silvery, up to ca. 0.7 mm long, erect or appressed; *young twigs* quadrangular, slightly to strongly winged, often sulcate (at least when dry), densely to moderately appressed-pubescent, the older twigs at first scaly with longitudinal striations or fibers, eventually smooth with irregular scales falling as patches. LEAVES elliptic, oblong, elliptic-oblanceolate, elliptic-obovate, or lanceolate, 4.5–14 cm long, 2.4–7.5 cm wide, 1.6–4 times as long as wide, densely to sparsely appressed pubescent below, subglabrous except for puberulent midvein above, the immature leaves covering the twig apex in 2 decussate pairs; *apex* acute, acuminate, to rounded; *base* rounded to slightly cordate; *petiole* 2–5 mm long, 1–2 mm thick, channeled, densely pubescent to subglabrous; *venation* brochidodromous distally to eucamptodromous proximally, the midvein impressed above, prominent below, the lateral veins 9–22 prominent pairs, ascending at angle of ca. 45°, nearly straight, curving toward apex near the margin and connecting with the next lateral, the marginal vein not clearly present or arching between the laterals, the tertiary veins connecting the laterals in a ladder-like to reticulate pattern; *blades* coriaceous to submembranous, drying yellow-green, gray-green, to dark reddish brown. FLOWER BUDS subfusiform to pyriform, 9–14 mm long, sometimes strongly constricted near the midpoint, the hypanthium narrowly campanulate, barrel shaped or fusiform 4–6 mm long, the distal portion of bud more or less ovoid, sometimes strongly so with a conical apex, 4.5–9.5 mm long; *indumentum pattern of buds* with peduncles, hypanthium, and bracteoles sparsely to moderately appressed pubescent, the calyx without glabrous to sparsely pubescent (usually less densely covered than that hypanthium), the calyx glabrous or densely pubescent within, the petals, disk, and style glabrous; *peduncles* 1–3-flowered, 1–3.5 cm long, 1–1.5 mm thick, terete; *bracteoles* linear to narrowly triangular, 2–5 mm long. CALYX closed, tearing irregularly as the bud opens, persisting or falling in ca. 3 parts; *petals* obovate to elliptic, 13–22 mm long; *disk* 4–6 mm across; *stamens* 280–720, 7–15 mm long; *anthers* 0.7–1 mm long, with 1–7(–10) glands; *style* 10–15 mm long; *ovary* 3–6-locular; *ovules* 90–180 per locule, multiseriate. FRUIT globose to pyriform, 2–6(–8) cm long, green to yellow without, with pink,

yellow, or white flesh, aromatic; *seeds* 100–400, perhaps more in large fruits, subreniform to subtriangular, 2–4 mm long, more or less smooth, the seed coat 0.2–0.25 mm thick at narrowest point. $2n$ =22, 44. (Fig. 7).

**Representative specimens. CUBA**. **Camagüey**: La Gloria, (21.73°N, 77.64°W), 28 Jan 1909 (fr), *Shafer 91* (NY). **Isla de la Juventud**: (21.69°N, 82.86°W), 25 Jun 1901 (fl), *Taylor 148* (NY). **La Habana**: in Campo Florido inter urbem et Loma Coca, (23.09°N, 82.12°W), 27 May 1923 (yfr), *Ekman 16419* (NY). **Santiago de Cuba**: Segundo Frente, Mayarí Arriba, Sierra de Nipe, cerca de Seboruco, (20.32°N, 75.59°W), 1 Nov 1977 (fl), *Álvarez. et al. 35937* (JE). **Villa Clara**: Cieneguita, District of Cienfuegos, (22.27°N, 80.61°W), 3 May 1895 (fl, fr), *Combs 1* (NY).

**DOMINICAN REPUBLIC**. **Barahona**: Sierra de Bahoruco, 10 km de La Cienaga en camino a Aguita Blanca y El Platón, (18.05°N, 71.16°W), 22 May 1984 (fr), *Zanoni 30134* (ASU0004820). **La Vega**: 5 km S of Constanza (18°52'N, 70°43'W), 1400 m, 24 Jul 1980 (fl), *Mejía & Zanoni 7668* (MO). **San Cristóbal**: Arroyo Juan Gomito, 3 km NW of La Estancia on road to Hato Viejo, a feeder stream and woodland of Río Guanuma, (18.68°N, 70.05°W), 13 Aug 1980 (fr), *Mejía 7917* (ASU0004876). **San Pedro**: S of Boca de Soco, at SW bank of Río Soco, small village along river and seacoast (18°28'N, 69°17'W), 5 m, 15 Oct 1980 (fr), *Mejía & Zanoni 8574* (MO). **Santiago Rodríguez**: about 4 km SW of Cañada Grande (of Monción) on road to La Meseta and La Leonor, (19.40°N, 71.19°W), 18 Aug 1989 (fr), *Jones 132* (ASU0004816). **Valverde**: Cordillera Septentrional, Valverde-Santiago limits, sobre loma (Pico) El Murazo, (19.68°N, 70.97°W), 18 Dec 1984 (fr), *Zanoni 32897* (ASU0004829).

**HAITI**. **Du Nord**: Ducroix, near Cap Hatien, (19.78°N, 72.22°W), 3 May 1988 (fl), *Chandler 30* (USF).

**JAMAICA**. **Clarendon/St. Ann**: 2 mi NW of Mason River Field Station, ca. 5 mi NW of Kellits, (18.21°N, 77.29°W), 655 m, 30 Dec 1979 (fl), *Pruski 1554* (IJ). **Portland**: Saint Margarets Bay, Hope Bay, (18.19°N, 76.53°W), 26 Feb 1906 (fl), *Wight 140* (NY). **St. Andrew**: in thicket, near Richards reservoir, Mona, (18.00°N, 76.76°W), 168 m, 13 Dec 1957 (fl), *Yuncker 17751* (NY). **St. Elizabeth**: Pit 101, Kaiser mine area S of Gutters, (18.01°N, 77.61°W), 16 Sep 1954 (st), *Howard 13861* (IJ). **St. Mary**: 1 mi E of Río Nuevo, (18.40°N, 77.00°W), 3 Nov 1968 (fl), *Proctor 29291* (IJ). **St. Thomas**: Port Morant Light House, (17.92°N, 76.19°W), 6 May 2000, (fl, yfr), *Parker 2847* (IJ). **Trelawny**: Ramgoat Cave, (18.31°N, 77.56°W), 545 m, 12 Mar 2013 (st), *Campbell s.n.* (IJ).

**PUERTO RICO**. Barrio Maricao Afuera, Maricao Forest Reserve, Rt. 120, km 16.9, ca. 30 m before km marker on north side of rd, (18.16°S, 67.00°W), 723 m, 15 Aug 2001, *Salywon 1281* (ASU); 1.2 mi on Rte 675 from junction with Rte 676, then 3 mi S on side rd (18°24'N, 66°22'W), 31 Dec 1980 (fl, yfr), *Solomon 5725* (MO).

**Phenology**—Flowering and fruiting throughout the year but probably mainly flowering in May to July and fruiting in August.

**Habitat and Distribution**—Found in forests and charrascales, but usually in disturbed areas such as roadsides and pastures from near sea level to 1000 m. Cultivated in tropical and subtropical regions around the world and frequently escaping and weedy. Native to the Americas; perhaps first cultivated in South America (Arévalo et al. 2021; Landrum 2021).

**Common names**—Guayaba (Spanish), guava (English), gwayav (Haitian Creole).

**Distinguishing Features**—Calyx closed in flower bud or open only as a terminal pore, tearing irregularly as the bud opens, usually in 2 or 3 parts; lateral veins usually more than 10 pairs; hairs on lower leaf surface appressed, whitish, or silvery.

6. ***Psidium guineense*** Sw., Prodr. 77. 1788. TYPE. "Insula principis Africes, in Domingo culta." On type specimens: "Culta in Hispaniola," "ex Africa". Presumably, *Swartz s.n.* (HOLOTYPE: S-R-5302; ISOTYPES: BM-616940, SBT-12641).

See extensive synonym in Landrum 2022.

Shrub or small tree up to about 6 m high, typically densely covered with velvety to subtomentose indumentum on the inflorescence and young growth but sometimes nearly glabrous, the trunk smooth to scaly; *hairs* simple, spreading (loosely appressed) to erect, often tangled together, grayish to reddish brown, ca. 0.3–0.5 mm long; *young twigs* densely to moderately velutinous, or less often glabrous, compressed to terete in section, losing indumentum in about 1 year, usually not angled but sometimes grooved when young, vigorous shoots sometimes weakly angled, the older bark usually remaining more or less smooth, less often somewhat flaky or stringy. LEAVES elliptic, elliptic-oblong, obovate, 4–11.5 cm long, 2–8 cm wide, 1.3–2.4 times as long as wide, usually densely to moderately velutinous below, glabrous to covered with hairs along the midvein above, the margin entire; *apex* obtuse, rounded, or acute; *base* rounded to acute; *petiole* 4–12 mm long, 1.5–2 mm thick, channeled, densely to sparsely pubescent, rarely glabrous; *venation* brochidodromous to eucamptodromous distally, the midvein impressed or nearly flat above, prominent below, the lateral veins 5–10 pairs, ascending at an angle of ca. 45°, diminishing and looping near the margin to connect with the next lateral, a clear marginal vein not formed, the tertiary veins, connecting the laterals in a ladder-like to reticulate pattern; *blades* coriaceous, drying yellowish brown to reddish brown, concolorous to somewhat darker above, when dry often mottled and/or lustrous above. FLOWER BUDS pyriform, 8–15(–17) mm long, the hypanthium ellipsoid to obconic, 3.5–7 mm long, the distal portion of bud ellipsoid, subglobose, or ovoid, 4.5–10 mm long; *indumentum pattern of buds* with all external surfaces moderately to densely pubescent (rarely subglabrous), the calyx pubescent without, but less densely so than hypanthium, distally pubescent within, the petals pubescent without, the disk sparsely pubescent (less often glabrous), the style glabrous; *peduncles* terete to compressed, 9–25(–30) mm long, 1–2 mm wide, uniflorous or triflorous, the branches of the dichasium when present 2–12 mm long; *bracteoles* narrowly triangular, ca. 2–3 mm long, caducous at about anthesis. CALYX closed completely, or with a terminal, pore-like opening at the apex, tearing longitudinally to the staminal ring, usually in 5 parts, these sometimes persisting until the fruit matures, the margin of calyx pore if present sinuate or with 5 small lobes; *petals* elliptic to obovate, concave, 7–15 mm long, 7–10 mm wide, sometimes more than 5; *disk* 4–5 mm across; *stamens* 180–300, 7–10 mm long; *anthers* 1–3 mm long, more or less introrsely dehiscent, the glands in the connective 1 to over 50; *style* 8–12 mm long; *ovary* 3–5-locular; *ovules* 50–100 per locule, ca. 8-seriate. FRUIT subglobose to ellipsoidal, 1–3 cm long; *seeds* 19–250 per fruit, 2.5–5 mm long, the seed coat 0.2–0.3 mm thick at narrowest point. $2n$ =44. (Fig. 8).

**Representative specimens. CUBA**. **Guantánamo**: Yateras, Sierra de Frijol, en el camino del Riíto a Cayo Fortuna, (20.39°N, 74.92°W), 700 m, 12 May 1983 (fl), *Arias et al. 49321* (JE); subida hacia la zona de Monte Líbano, (20.28°N, 75.15°W), 300 m, without date (fl), *Bisse & Kohler 7928* (HAC, JE); La Prenda, (20.34°N, 75.04°W), 11 Jul 1919, *Bro. Hioram 2501* (NY); montanas de Guantánamo, (20.15°N, 74.87°W), 16 May 1983 (ofl), *Urquiola 685* (ASU0004977). **Holguín**: Pinares de Mayarí, Pinar Redondo, en el camino de La Chivera a Río Piloto, (20.40°N, 75.78°W), 400 m, 25 May 1983 (yfr), *Arias et al. 50203* (JE); Cuchilos de Toa, Cayo Fortuna, trillo de Riíto a Piloto Arriba, (20.52°N, 74.88°W), 31 Mar 1972 (fl), *Bisse & Berazaín 22249* (HAC, JE); Sierra de Nipe in pinetis, (20.46°N, 75.83°W), 20 Oct 1919, *Ekman 9776* (NY).

**HAITI**. **Grand'Anse**: Massif de la Hotte, western group, Corail, on the road to Dutreuil, hillside, (18.40°N, 74°W), 100 m, 29 Sep 1928 (st), *Ekman H10766* (NY). **Nord-Est**: Massif du Norde, Vallière, slope of Morne Salnave, (19.44°N, 71.88°W), 800 m, 1 May 1928, *Ekman H9931* (US).

**JAMAICA**. **St. Andrew**: vicinity of Irish Town, (18.05°N, 76.72°W), 783 m, 6 Mar 1960 (fr), *Proctor 20669* (IJ, MICH); Coakley district, along junction road, (18.16°N, 76.83°W), 10 Apr 1960 (fl, fr), *Proctor 20770* (IJ).

**Phenology**—Flowering throughout the year but probably mainly from March to May; fruiting throughout the year but probably mainly from June to August.

**Habitat and Distribution**—Mainly disturbed areas from 100 to 700 m. *Psidium guineense* is a widespread species of disturbed habitats, ranging from northern Argentina to Mexico and the Caribbean. It has been widely introduced in subtropical and tropical areas around the world.

**Distinguishing Features**—Calyx closed or with a small terminal pore in bud, usually tearing into 5 parts; lateral veins 5–10 pairs, usually with a ladder-like pattern of tertiary veins; indumentum of lower leaf surface more or less erect, reddish brown (sometimes more or less appressed whitish or gray in continental America); anthers 1–3 mm long, often with more than 10 glands.

**7. *Psidium harrisianum*** Urb., Symb. Ant. (Urban). 7: 294. 1912. TYPE. Jamaica, "supra Clarendon in sylvis Peckham dictis, 800 m. alt.," *Harris 11000* (HOLOTYPE: B, lost; ISOTYPE: NY-1288054!).

Shrub or small tree 1.5–10 m high, glabrous except for inner surface of calyx and staminal ring, densely glandular on young growth; *hairs* less than 0.1 mm long, reddish brown to whitish; *young twigs* whitish, spotted with reddish brown glands (less often dry dark brown with glands of the same color), the first bark falling as thin flakes, the older twigs reddish gray. LEAVES suborbicular, sessile or nearly so, 2–8 cm long, 1.8–7 cm wide, 0.9-1.1(–1.5) times as long as wide; *apex* rounded to truncate, sometimes emarginate to indented; *base* cordate to truncate; *petiole* 0–1 mm long, 0.5–3 mm wide; *venation* brochidodromous, the midvein prominent below, about flat above, the lateral veins 4–6 pairs, leaving the midvein at angle of 45 to nearly 90 degrees, the marginal vein arching deeply between laterals, running from about 1–10 mm from the margin, the tertiary veins weak, dendritic; *blades* subcoriaceous, somewhat lustrous above and below, drying dark reddish brown to gray green, lighter below. FLOWER BUDS pyriform, 3.5–4 mm long, usually constricted between calyx and hypanthium, "dull red" when fresh (ex *Franck 3796*); *hypanthium* obconic, campanulate, ca. 2 mm long; *indumentum pattern of buds* with all external surfaces glabrous, the inner surface of calyx and staminal ring strigose-puberulent; *peduncles* 3–8 mm long, 0.3–0.8 mm wide; *bracteoles* narrowly triangular, 0.3–0.5 mm long, usually deciduous before anthesis. CALYX closed or with a terminal small pore, tearing irregularly in 2–4 [persistent?] parts; *petals* not seen extended, glabrous, densely glandular; *disk* within staminal ring, ca. 1.5 mm across; *stamens* 35–47, probably ca 3 mm long; *anthers* subglobose, ca. 0.5 mm long, with a terminal gland and 4–7 smaller glands below; *style* ca. 2.5 mm long; *ovary* 2-locular; *ovules* borne on the edge of a peltate placenta, 8–19 per locule, mainly 1-seriate on each lamella. FRUIT subglobose, 1–1.5 cm wide; *seeds* 17 in one fruit, 4–5 mm long. (Fig. 9).

**Representative specimens. JAMAICA. Clarendon**: Peckham Woods, (18.20°N, 77.39°W), 770 m, 4 May 2015, *Franck 3796* (USF); Peckham Woods, (18.17°N, 77.41°W), 762 m, 15 Aug 1954 (fl), *Webster & Proctor 5420* (IJ, MICH). **St. Ann**: Douglas Castle district, (18.20°N, 77.27°W), 701 m, 8 Oct 1977 (fr), *Proctor 37325* (FTG, IJ, MO). **St. Catherine**: Forest Reserve area east of Crofts Mountain, (18.13°N, 77.18°W), 503 m, 6 Sep 1962 (fl), *Proctor 22738* (IJ, MICH). **Trelawny**: Cockpit Country, Lichfield–Barret Hut, `Little Kilimanjaro Hill`, (18.25°N, 77.50°W), 600 m, 17 Mar 2011 (fl, fr), *Abdo & Campbell 2610* (FTG); Burnt Hill, (18.31°N, 77.56°W), 549 m, 3 Sep 1965 (fr), *Proctor 26691* (IJ, MICH).

**Phenology**—Flowering or with flower buds from March to November; fruiting in September, October, and March.

**Habitat and distribution**—Wooded limestone hills at 500 to 800 m; a rare endemic and perhaps endangered species of the central Jamaican highlands.

**Distinguishing features**—Large suborbicular leaves up to 8 cm long with lateral veins leaving

the midvein at an angle of 45 to 90 degrees; flower buds 3.5–4 mm long.

**8. *Psidium minutifolium*** Krug & Urb., Bot. Jahrb. Syst. 19: 569. 1894. TYPE. Cuba. "in Cuba orientali prope Baracoa, in summo monte Yunque," *Wright s.n.* (HOLOTYPE: B, lost; ISOTYPE: GOET-8269; probable isotype, *Wright 2464* MO!, NY-fragment!).

*Psidium jakucsianum* Borhidi, Bot. Kozlem 64(3): 214. 1977. TYPE. Cuba. "Oriente, Charrascos de la Ermita, al Este del Yunque de Baracoa," *Alain et al. 7568* (HOLOTYPE: HAC!; ISOTYPES: BP, HAC!).

Shrub or subshrub (probably less than 30 cm high), nearly glabrous except for inner surface of calyx and sometimes minutely puberulent young growth; *hairs* reddish brown to whitish, appressed or erect; *young twigs* 4-winged, reddish brown, the wings 0.1–0.3 mm wide, appearing to point in the direction of the leaf above, expanding somewhat at base of petiole into stipule-like lobes, the older bark becoming gray, falling in strips, with portions of wings falling in units, eventually scaly. LEAVES elliptic to obovate, 5–15(–20) mm long, 4–15 mm wide, 1–2 times as long as wide; *apex* obtuse to acute; *base* cuneate; *petiole* 1–2 mm long, 0.5–1 mm wide; *venation* mainly obscure, the midvein somewhat prominent below, impressed proximally above, 4–6 lateral veins rarely scarcely visible, leaving the midvein at an angle of 45–60°; coriaceous, strongly glandular, somewhat lustrous above, dull below, the margin revolute. FLOWER BUDS pyriform, 5–6 mm long; hypanthium campanulate, constricted below calyx tube, 2–2.5 mm long, the distal portion of bud subglobose, 3–3.5 mm long; *indumentum pattern of buds* with all external surfaces glabrous except for strigose petals; *peduncles* 11–18 mm long, 0.3–1 mm wide, 1-flowered, glabrous, glandular, borne in the axils of leaves or small bracts; *bracteoles* narrowly triangular, 0.5–1 mm long. CALYX closed in the bud, tearing in 4 nearly equal lobes, the tears not cutting the staminal ring, the inner calyx surface puberulent; *petals* 4, glandular, externally sparsely strigose; *disk* including staminal ring ca. 3 mm across, within staminal ring, ca. 1 mm across, the staminal ring puberulent; *stamens* ca. 60, probably 3–4 mm long; *anthers* ca. 0.5 mm long, with a terminal gland and 2–9 smaller glands below; *style* ca. 3–4 mm long, glabrous; *ovary* 2–3-locular; *ovules* 10–14, borne on a peltate placenta. FRUIT globose, ca. 6–10 mm long. (Fig. 10).

**Representative specimens. CUBA**. **Guantánamo**: Baracoa, Quibiján, Sierra Azul, (20.35°N, 74.63°W), 400 m, 31 Jan 1968 (st), *Bisse & Kohler 5492* (JE); Baracoa, subida a la Mina Iberia [Parque Nacional Alejandro Humboldt], (20.46°N, 74.73°W), 300 m, 29 Feb 1968 (st), *Bisse & Kohler 6158* (JE); Baracoa, en la cima del Yunque de Baracoa, (20.34°N, 74.55°W), 500 m, 31 Mar 1970 (bud), *Bisse 17121* (JE). **Guantánamo**: Baracoa, orillas del Río Báez, cerca del campamento `Los Naranjos`, (20.44°N, 74.60°W), 1 Aug 1975 (old fl), *Bisse et al. 26901* (JE); Baracoa, Yunque de Baracoa, falda sureste, (20.34°N, 74.55°W), 28 Feb 1979 (st), *Bisse et al. 40109* (HAJB, JE). **Holguín**: Oriente, Moa, Cayo Chico, (20.64°N, 74.94°W), 19 Nov 1945, *Acuña 13261* (NY); Moa, La Melba, altiplano sur de la Sierra de Moa, (20.45°N, 74.82°W), 25 Feb 1979 (yfr), *Bisse et al. 39950* (JE); Moa, Cayo Guan Mine, (20.61°N, 74.85°W), 18 Jul 1947 (fl), *León & Clemente 23146* (NY). **Santiago de Cuba**: Mayarí, Pinares de Mayarí, mogotes y barranco de Río Piloto en su curso medio, (20.40°N, 75.78°W), 400 m, 1 Jun 1983 (st), *Arias et al. 50671* (JE).

**Phenology**—Flowering February to April and July to August; fruiting August to November.

**Habitat and distribution**— Endemic to eastern Cuba; known from 200–700 m, in charrascal vegetation and humid forest, on limestone and ultrabasic rock.

**Distinguishing features**—Leaves mostly less than 2 cm long, elliptic to obovate; peduncles sometimes longer than the leaves.

*Psidium minutifolium* and *P. parvifolium* have similar distributions, mainly in eastern Cuba. Usually, they are easily distinguished by the size of their leaves and other characters included

in the key below. Both are variable and occasionally problematic specimens are difficult to assign to either species. We think at least three specimens may be hybrids: *Arias et al. 50300* (HAJB, JE); *Bisse & Rojas 3528* (HAJB, JE); and *Bisse & Rojas 3957* (HAJB, JE). Images may be viewed on CoTram. Field observations on these two species are encouraged to establish if they have habitat preferences and habit or phenological characteristics that may help to distinguish them.

1. Leaf 0.5–1.5(–2) cm long, usually elliptic, less often obovate; midvein usually impressed, at least proximally above; young twigs 4-winged; flower bud 5–6 mm long; stamens ca. 60; style 3–4 mm long; ovules per locule 10–12; fruit 6–10 mm long; peduncles 11–18 mm long, 1-flowered..... ***P. minutifolium***
1' Leaf (1.5–)2–4(–5) cm long, usually obovate to oblanceolate; midvein nearly flat to raised above; young twigs smooth, compressed to terete; flower bud 6–9 mm long; stamens 80–255; style 6–8 mm long; ovules per locule 14–30; fruit 7–20 mm long; peduncle 6–32 mm long, 1–3-flowered. ..... ***P. parvifolium***

**9. *Psidium montanum*** Sw., Prodr. 77. 1788. TYPE. Jamaica. *Swartz s.n.* (HOLOTYPE: S-R-9480, =ASU photo; ISOTYPES: B-W09476-01, MEL-2396530, SBT-12638).

***Psidium wrightii*** Lamb. ex W. Wright, Memoir W. Wright 278. 1828. TYPE. In Wright's herbarium from Jamaica, not found; description and common name of Mountain Guava leave little doubt about identity.
***Guajava montana*** (Sw.) Kuntze Rev. Gen. 1: 240. 1891.

Tree up to 16 m high, essentially glabrous except for inner surface of calyx and sometimes other floral surfaces and young twigs, the trunk smooth or scaly, the bark reddish or mottled; hairs whitish, up to ca. 0.5 mm long, mainly antrorsely appressed; young twigs glabrous or puberulent, quadrangular with four wings, gray to reddish brown, becoming terete in about 1 year, the older bark smooth or scaley. LEAVES lanceolate, ovate, or elliptic 5–12 cm long, 2–5 cm wide, 1.8–3.3 times as long as wide; apex acute to acuminate, often turned downward and flattened to one side when pressed, the tip often blunt; base broadly rounded to acute, often oblique; petiole channeled to nearly flat above, (2–)3–10 mm long, 0.8–2 mm thick; midvein impressed above, prominent below; venation brochidodromous, the lateral veins 7–12 pairs, raised slightly below, sometimes impressed above, nearly straight, leaving midvein at an angle of 45–60°, alternating with weaker dendritic veins that seem to arise either from the marginal or midvein; marginal vein arching slightly between the laterals; blades coriaceous to subcoriaceous at maturity, drying dark olive green to reddish brown. FLOWER BUDS pyriform to subrhomboidal, 8–15 mm long, the tip abruptly acuminate to rounded, the base obconic to tapering; peduncles 5–16 mm long, up to ca. 1.5 mm thick, subterete of 4-angled, 1–3-flowered; bracteoles narrowly triangular, 1–4 mm long, deciduous at about anthesis; calyx closed in bud, sometimes with a minute pore at the tip, more often with an apiculate closed tip, glabrous to pubescent without, pubescent within, tearing irregularly, usually persisting, the remnants 0.3–0.5 mm thick when dry; petals suborbicular to obovate, ca. 1 cm long, often pubescent within and without; hypanthium glabrous to pubescent, continuous with closed calyx; disk 8–10 mm across, pubescent; stamens 0.8–1 cm long, 150–360; anthers ca. 1 mm long, with 3–10 glands in the connective; style probably about as long as stamens, the stigma peltate; ovary 3–4-locular, or locules poorly developed; ovules 10–20, or apparently none (abortive?). FRUIT globose, up to 3.5 cm in diameter; seeds ca. 30, ca. 5 mm long. (Fig. 11).

**Representative specimens examined. JAMAICA**. **Manchester**: Vicinity of Walderston, (18.13°N, 77.49°W), 9 Jan 1963 (fr), *Proctor 23127* (IJ, MICH); Green Vale, 1.5 mi W of Mandeville, (18.02°N, 77.51°W), 701 m, 27 May 1965 (fl), *Proctor 26438* (IJ, MICH); Marshalls Pen, 2.25 miles due NW of Mandeville, (18.05°N, 77.53°W), 640 m, 16 Aug 1965 (st), *Proctor 26606* (IJ). **Portland**: Muriel's Rock, along road between Section and

Hardwar Gap, (18.08°N, 76.74°W), 1036 m, 24 Nov 1971 (fl), *Proctor 32738* (IJ, NY). **St Andrew**: near Cinchona, (18.07°N, 76.66°W), 610 m, 25 Apr 1894 (st), *Harris 5156* (UWI). **St. Elizabeth**: Retirement district near Malvern, (17.98°N, 77.71°W), 12 Sep 1954, *Howard & Proctor 13680* (BM, NY). **Trelawny**: Tyre, near Troy, (18.25°N, 77.60°W), 610 m, 25 Feb 1906 (fl), *Harris 9406* (NY, UWI).

**Phenology**—Flowering mainly from February to August; fruiting mainly September to December.

**Habitat and distribution**—Endemic to Jamaica; woods and pastures on limestone hills, sometimes on bauxite soil at elevations of 550–1200 m.

**Distinguishing features**—Tree up to 16 m high; leaves lanceolate, ovate, or elliptic 5–12 cm long; flower buds mainly 1–1.5 cm long; fruit globose, up to 3.5 cm in diameter; seeds ca. 30, ca. 5 mm long.

**Common name—**Mountain guava.

According to Proctor (1972) the fruits taste like mangos. In only 1 of 5 specimens examined (1 bud each) were there well developed ovules. Perhaps the abortive ovules are cause by a disease. The fruits are often attacked by insect larvae.

*Psidium berteroanum* O. Berg, was apparently described from a specimen collected by Bertero in Puerto Rico. De Candolle saw the specimen of Bertero and considered it *P. montanum* of Jamaica. He quoted Bertero with the following: "spirant ut flores odorem amygdalarum amararum unde dicitur *almadron*", which we translate as "flowers breathe the scent of bitter almonds, hence the name *almadron*". No type has been found and *P. montanum* is not known to grow in Puerto Rico.

**10. *Psidium nannophyllum*** Alain, Phytologia 25: 270. 1973. TYPE. Dominican Republic. Bonao, Loma Peguera, 300–400 m, 8 Aug 1970 (fl, fr), *Liogier 17378* (HOLOTYPE: NY-1288064!; ISOTYPES: F-76378f!, JBSD!, MICH-1210409!, MO!, US!)

Shrub 1–1.5 m high, with spreading branches, glabrous or minutely puberulent on some young growth; *hairs* reddish brown, less than 0.1 mm long, somewhat curled; *young twigs* more or less 4-winged, reddish brown, the older twigs becoming gray, eventually becoming terete. LEAVES ovate to suborbicular, 5–10 mm long, 4–9 mm wide, 0.7–1.2 times as long as wide, frequently overlapping, the internodes 1–4 mm long, shorter than the leaves; *apex* rounded, acute, acuminate, or abruptly acuminate; *base* rounded to subcordate; *petiole* 0.5–1.5 mm long, 0.5–1 mm wide; *venation* obscure except for midvein, rarely with a few lateral veins scarcely visible, these leaving the midvein at an angle of less than 45 degrees; *blades* coriaceous, more or less flat, or folding upward (at least when drying), densely glandular. FLOWER BUDS pyriform, 3.5–4 mm long; *hypanthium* obconic, ca. 1.5 mm long; *indumentum pattern of buds* with all external surfaces glabrous, the inner surface of calyx and staminal ring puberulent; *peduncles* uniflorous, 2.5–5 mm long, ca. 0.5 mm wide, compressed at anthesis, subterete at fruiting; *bracteoles* narrowly triangular, ca. 0.5–1.5 mm long. CALYX closed in bud, tearing irregularly in 2–3 parts, persisting or falling by time fruit is mature; *petals* elliptic, 3–4 mm long, strongly glandular, minutely strigose externally; *disk* within staminal ring, glabrous, 1.5–2 mm across; *stamens* 25–30, 3–4 mm long; *anthers* subglobose, 0.3–0.5 mm long, with a terminal gland and 2–6 smaller glands below; *style* glabrous, ca. 2.5–3.5 mm long; *ovary* 2-locular; *ovules* 10–12, reflexed, borne on the edge of aa peltate placenta, mainly uniseriate on each lamella. FRUIT subglobose, 7–10 mm long; fruit wall mostly 0.8–1 mm thick; *seeds* ca. 8, 3–3.5 mm long, with rounded and flat sides. (Fig. 12).

**Additional specimens examined. DOMINICAN REPUBLIC**. Monseñor Nouel, Sierra de Yamasá, Loma La Peguera (18°55'N, 70°19'W), 530 m, 20 Jun 2008 (fl), *Veloz 4211* (JBSD); Monseñor Nouel, Loma la Peguera area (18°54'N, 70°20'W), 1700 m, 23 Apr 1981 (fl), *Zanoni 12917* (ASU0316587-photos, JBSD).

**Phenology**—Poorly known, flowering April to August; fruiting in August.

**Habitat and distribution**—Hills and canyons; endemic to Dominican Republic, known from three collections in an area of mining; in great need of an environmental assessment.

**Distinguishing features**—Small shrub with wand-like branches, with the leaves overlapping on the stems; leaves ovate to suborbicular, 5–10 mm long; *apex* rounded, acute, acuminate, or abruptly acuminate; *base* rounded to subcordate.

## 11. *Psidium nummularia* (C.Wright ex Griseb.) C.Wright, Anales Acad. Ci. Med. Habana 5: 433. 1869.

***Eugenia nummularia*** C. Wright ex Griseb., Cat. Pl. Cub. 86. 1866. TYPE. Cuba. "Guajarba," [Guaijabon], (ca. 22.79°N, 83.36°W), *Wright 2458* (HOLOTYPE: GOET-8270; ISOTYPES: BM-616947, G-227832!, GH-69309, K-276441, MO-313488, NY-1288065!, US-118076!, YU-1606).

***Psidium celastroides*** Urb., Symb. Ant. 9: 463. 1928. TYPE. Cuba. "Prov. Santa Clara in montibus Siguanea-Trinidad in valli Hanabanilla ad Finca Playitas in collibus calcareis 600 m," *Ekman 18471* (HOLOTYPE: B, lost; ISOTYPES: A-71237, NY-1288038!, S-R-9443 [annotated as lectotype by Urquiola but perhaps never published]).

***Psidium scopulorum*** Ekman & Urb., Symb. Ant. 9: 465. 1928. TYPE. Cuba. "Prov. Pinar del Rio....Sierra de Vinales," (ca. 22.59°N, 83.72°W), 6 Jun 1923 (fl bud), *Ekman 16564* (SYNTYPE; B, lost; ISOSYNTYPES: F-76380f, G-227667!, NY-1288090!, S-R-8380 [annotated as lectotype by Urquiola, 1997, but perhaps never published], "in Sierra de Guacamayas in cacumine Mogote de la Baliz," (ca. 22.71°N, 83.59°W), *Ekman 17980* (SYNTYPE: B, lost; ISOSYNTYPE: NY!), and "prope Sumidero pro omnibus formationibus mogote dictus," (ca. 22.74°N, 83.30°W), *Ekman 18219* (SYNTYPE: B, lost; ISOSYNTYPE: NY!).

***Psidium tomasianum*** Urb. & Ekman, Symb. Antill. (Urban). 9(4): 465. 1928. TYPE. Cuba. Prov. Pinar del Río, prope Viñales in cacumine Sierra del Sitio Santo Tomás, *Ekman 18025* (HOLOTYPE: B, lost; ISOTYPE: NY-1288094!).

***Psidium acunae*** Borhidi, Acta Bot. Acad. Sci. Hung. 17:17. "1971" 1972. TYPE. Cuba. Prov. Pinar del Río, Sierra de los Órganos, Pan de Guajaibón, [Type locality of *Eugenia nummularia*], 750 m, 2 May 1959 (fl, fr), *Alain 6782* (HAC!, =ASU photo).

Shrub or small tree glabrous, or minutely hirsute or puberulent on young twigs, calyx within, and staminal ring; *hairs* reddish brown to whitish, less than 0.1 mm long; *young twigs* reddish brown, becoming whitish with age, often bifurcating, the bark of older twigs falling as thin flakes. LEAVES suborbicular to oblong ovate, 7–17 mm long, 8–13 mm wide, 0.9–1.2 times as long as wide; *apex* rounded to barely emarginate; *base* subcordate, rounded, broadly cuneate, or abruptly acuminate; *petiole* 0.5–1 mm long and wide; *venation* obscure, or ca. 4 pairs of lateral veins faintly visible, these leaving the midvein at 60° or more, the marginal veins arching broadly between the laterals, 1–2 mm from margin; *blades* coriaceous, the margin somewhat revolute, densely glandular, drying dark gray-green. FLOWER BUDS narrowly pyriform, ca. 5 mm long, the apex sometimes apiculate; *hypanthium* narrowly campanulate; *indumentum pattern of buds* glabrous without, the inner surface of calyx and staminal ring puberulent; *peduncles* 4–10 mm long, 0.4–0.8 mm wide; *bracteoles* narrowly triangular, ca. 0.5 mm long. CALYX closed or with 4 minute lobes, tearing in 3 or 4 parts, puberulent-strigose within, persisting until fruit matures; *petals* not seen; *disk* within staminal ring, ca. 2 mm wide in fruit; *stamens* ca. 86, 2–3.5 mm long; *anthers* ca. 0.5 mm long, with a terminal gland and 2–4 smaller glands below; *style* 3–4 mm long; *ovary* 2–3-locular; *ovules* per locule 7–26. FRUIT subglobose, 5–7 mm long; *seeds* ca. 3, 3–4 mm long, with

flat and rounded sides. (Fig. 13).

**Representative specimens examined. CUBA**. **Pinar del Río**: Sierra de Quemado, El Moncada, Viñales, (22.52°N, 83.86°W), 20 May 1988 (fl), *Luis 4571* (ASU0069452); Sierra de la Guira, Los Palacios, (22.71°N, 83.37°W), 2 Jul 1988 (fl, yfr), *Luis 4693* (ASU); cultivated in Jardín Botánico del Pinar del Río, procedente de Mogotes, Viñales, 19 May 2018 (fl), *Oviedo* (FTG); Sierra de Mesa (Mogotes), Sumidero, Minas de Matahambre, (22.42°N, 84°W), 14 Jul 1990 (st), *Urquiola 6477* (ASU0069453).

**Phenology**—Flowering in May and June; probably fruiting soon after flowering.

**Habitat and distribution**—Endemic to Cuba; found in vegetation associated with "mogotes" [isolated steep hills of calcareous rocks], sometimes on the walls of the mogotes.

**Distinguishing features**—Leaves suborbicular to oblong ovate, 7–17 mm long; apex rounded to barely emarginate; base subcordate, rounded, broadly cuneate, or abruptly acuminate; young twigs not winged, more or terete; western Cuba.

This species might be confused with *Psidium rotundatum*. It is compared with that species in the key below.

1. Leaves 0.7–1.7 cm long, 0.8–1.3 cm wide; lateral veins not visible or scarcely so; seeds ca. 3 mm long; style 3–4 mm long; peduncles 1-flowered ..... ***P. nummularia***
1' Leaves 1.7–5.5 cm long, 1.5–4.5 cm wide; lateral veins normally easily visible; seeds ca. 4–5 mm long; style 5–6 mm long; peduncles 1–3-flowered ..... ***P. rotundatum***

**12. *Psidium oligospermum*** DC., Prodr. 3: 236. 1828. TYPE. Brazil. "prov. Bahiensis," *Martius* [*2203*]. (HOLOTYPE: M-146868! [specimen annotated by de Candolle with description by Martius]; ISOTYPE: M-146867).

See extensive synonymy in Landrum 2022.

***Psidium galapagaeum*** Hook. f., Trans. Linn. Soc. 20: 224. 1847. TYPE. Ecuador. Galapagos, "James Island" [=Isla Santiago], *Scouler s.n.* (LECTOTYPE: K-565485 [designated by Porter, 1969]).

***Mitranthes sartoriana*** O. Berg, Linnaea 29: 248. 1858. TYPE. Mexico, Veracruz, "prope Mirador," *Sartorius s.n.* (HOLOTYPE: location not stated, B?; ISOTYPE: G-227668!).

***Calycorectes protractus*** Griseb., Cat. Pl. Cub. 284. 1866. TYPE. Cuba. "Cuba Occ., pr. Hanabana," *Wright* [*3557*]. (HOLOTYPE: GOET, n.v.; ISOTYPES: GH-68862, K-170083, NY-1434704, US-118238!).

***Calyptropsidium sintenisii*** Kiaersk., Bot. Tidsskr. 17: 280, fig. 10. 1890. TYPE. Puerto Rico. Sierra de Luquillo, Mt. Yunque, 13 Jul 1885 (fr), *Sintenis 1347* (HOLOTYPE: C?, not found. ISOTYPES: BM-796900, K-331064, K-565282, LD-1805089, LD-1818114, NY!)

***Psidium sartorianum*** (O. Berg) Niedenzu, Nat. Pflanzen. Fam. 3(7): 69. 1893.

***Psidium claraense*** Urb., Symb. Ant. 9: 466. 1928. TYPE. Cuba. Prov. Santa Clara prope Casilda, [21.78 °N, 80°W], "in fruticetis litoralibus solor arenoso salsuginoso", 28 Mar 1924 (bud), *Ekman 18887* (HOLOTYPE: B, lost; ISOTYPES: A-71238, G-227690!, NY-1288040!, S-R-8385 [annotated as lectotype by Urquiola,1997 but apparently never published]).

***Psidium microphyllum*** Britton, Botany of Puerto Rico and the Virgin Islands, 555. 1930. TYPE. Puerto Rico. Mayagüez Experiment Station, July 1930, *McClelland s.n.* (HOLOTYPE: NY-1365088!).

***Mitropsidium sartorianum*** (O. Berg) Burret, Notizbl. Bot. Gart. Berlin-Dahlem 15: 487. 1941.

***Mitropsidium sintenisii*** (Kiaersk.) Burret, Notizbl. Bot. Gart. Berlin-Dahlem 15: 489. 194.

***Psidium yucatanense*** Lundell, Contr. Univ. Michigan Herb. 7: 35. 1942. TYPE. Belize. Belize Dist., Belize-Sibun Road. *Gentle 9* (HOLOTYPE: MICH-1210419!; ISOTYPES: F-65684, K-565289, NY-1365092!, US-117680!).

***Psidium sintenisii*** (Kiaersk.) Alain, Mem. New York Bot. Gard. 21(2): 138. 1971.

***Psidium calyptranthoides*** Alain, Phytologia 54: 109. 1983. TYPE. Puerto Rico, Monte del Estado Forest, Maricao, 2800 ft, 8 Jul 1970 (fl), *Woodbury 20506* (HOLOTYPE: UPR; ISOTYPES: MICH!, NY!).

Tree up to ca. 30 m high, glabrous or sparsely to moderately pubescent on young growth; *hairs* simple, whitish, yellowish or reddish brown, minute or up to ca. 0.2(–0.4) mm long, curly,

suberect or antrorse; *young twigs* reddish brown to light yellow-green, glabrous to moderately pubescent, in age becoming glabrescent, gray, smooth, or slightly striate. LEAVES lanceolate to elliptic, 1.6–7.5(–8.3) cm long, 0.4–3.3 cm wide, 1.7–4(–5) times as long as wide, glabrous, or often sparsely pubescent along the margin and midvein above, the margin entire; *apex* sharply or obtusely acuminate, acute, or less often obtuse; *base* rounded, cuneate, acuminate; *petiole* channeled or not, 1–6 mm long, 0.3–1 mm wide, glabrous or pubescent; venation brochidodromous, the midvein about flat or less often slightly impressed proximally above, prominent below, the lateral veins weak, 4–10 pairs, leaving the midvein at an angle of ca. 45°, united near the margin by a broadly arching marginal vein; tertiary veins usually obscure, dendritic, appearing to arise mainly from the marginal vein; *blades* coriaceous to subcoriaceous, drying dark olive-green, reddish brown, or nearly black, often mottled with lighter spots above when dry, or sometimes the whole upper surface grayish. FLOWER BUD pyriform to subfusiform, 3–9 mm long, the hypanthium obconic to campanulate, 1–4 mm long, the distal portion of bud ovoid to subglobose, 2.5–6 mm long; *indumentum pattern of buds* with all external surfaces glabrous to sparsely puberulent or pubescent (rarely moderately so), the hypanthium and calyx often with less indumentum than peduncle, the calyx glabrous to puberulent within, often with an apical tuft of hairs, the petals glabrous or ciliate, or sometimes pubescent if exposed in the bud; disk within the staminal ring usually glabrous, the staminal ring sparsely puberulent, the style glabrous or sparsely puberulent proximally; *peduncles* 6–25 mm long, 0.5–1 mm wide, solitary, uniflorous, or less often triflorous, the branches of the dichasium up to ca. 7 mm long; *bracteoles* narrowly triangular to linear, 1–5 mm long, caducous before anthesis. CALYX completely closed, sometimes with an apiculate apex, or scarcely open with a sinuate margin, or with 4 or 5 short verrucose protuberances at the apical tip, thus appearing puckered at the apex, circumscissile above the staminal disk or tearing in 5 lobes or irregularly at anthesis, persisting briefly as a disk-shaped or conical calyptra or calyx pieces, the remains of the calyx usually falling before the fruit matures, the staminal disk borne on inner surface of the bowl-like calyx tube, the tube tearing as the fruit matures, the calyx (including tube with stamens) sometimes evident only as a circular scar in mature fruits; *petals* suborbicular, 2.5–6 mm long (perhaps sometimes falling with the calyptra); *disk* 1–5 mm across; *stamens* 4–12 mm long, 80–220; *anthers* 0.3–0.5 mm long, with a terminal gland and up to 4 smaller glands below; *style* 4–5 mm long; *ovary* 2–3-locular; *ovules* (4–)10–34 per locule, uniseriate or biseriate on each lamella, the placenta slightly peltate. FRUIT subglobose to pyriform, 5–25 mm long; *seeds* 1–13 per fruit, 3–7 mm long, sublenticular to hemispheric, usually with somewhat angular edges and at least one nearly flat surface. (Figs. 14, 15, & 16).

**Representative specimens examined. CUBA. Isla de la Juventud**: afluente del Río Los Indios (21.71°N, 82.95°W), 19 Oct 1991 (fr), *Urquiola 7498* (ASU0062227). **Matanzas**: Jaguey Grande (22.53°S, 81.13°W), 2 Aug 1923 (fr), *Ekman 16957* (ASU0005047-photos). **Pinar del Río**: San Juan y Martínez, Sabanalamar (22.15°S, 83.98°W), 25 Sep 1999 (st), *Urquiola 528* (FR).

**PUERTO RICO**. El Yunque, Los Picachos (18.310°N, 65.790°W), Sep 1959 (fr), *Woodbury s.n., R.* (NY); Maricao Afuera, Maricao Forest Reserve, Rt. 120, ca. 0.1 km before entrance to Monte del Estado, km 15.2. (18.14°N, 66.97°W), 810 m, 15 Aug 2001 (yfr), *Salywon 1276* (ASU0010481).

**Phenology**—Flowering mainly from April to June but as late as August; fruiting mainly from August to October.

**Habitat and distribution**—Forests to open areas on sandy and clay soils; a widely distributed species ranging from the Caribbean and Mexico to Argentina.

**Distinguishing features**—Tree up to ca. 30 m high; leaves often over 4 cm long lanceolate to elliptic, mostly 2–4 times as long as wide; apex obtuse, acute, to acuminate; base acute to

acuminate; petiole mostly 3–4 mm long; seeds 1–13 per fruit, 3–7 mm long.

*Psidium oligospermum* is a widespread and variable species; it is found on some isolated oceanic islands (e.g., Galapagos, Saint Lucia) and so has probably reached the Greater Antilles by long distance dispersal. The name *P. sintenisii* has been used for Puerto Rican populations and molecular evidence (Salywon 2003) indicates that it may have hybridized with a species of the *P. amplexicaule* group there.

**13. *Psidium parvifolium*** Griseb., Cat. Pl. Cub. 91. 1866. TYPE. Cuba. Mayarí Abajo, *Wright 2438* (probable SYNTYPE: GOET-8371; ISOSYNTYPES: G-227724!, GH-71247, K-170082, S-R-9444 [lower portion of mixed sheet], P-258513!) and "Cuba or[oriente]," *Wright 2463* (SYNTYPE: GOET-8273 [annotated as lectotype by A. J. Urquiola, 1997, but perhaps never published], GOET-8272; ISOSYNTYPES: BM-616948, G-227723!, GH-71249, HAC!, K-565285, P-258514!).

***Psidium nitidum*** C. Wright, Anales Acad. Ci. Med. Habana 5: 433. 1869. TYPE. Cuba. "En los pinares de la loma de" Cajálbana [Mun. La Palma, Pinar del Río] "y en" San Marcos [Mun. Bahia Honda, Artemisa], *Wright 743* [NY specimen has 743 and 3556 on one label of "Plantae Cubenses Wrightianae"], (HOLOTYPE:?; ISOTYPES: GH-71246, K-262640, NY-1288073!, NY-1288074!, US-117669!).

***Psidium parvifolium*** var. ***planifolium*** Krug et Urb., Bot. Jahrb. Syst. 19(4): 569. 1894. TYPE: Cuba. *Wright 3556* (HOLOTYPE: B, lost; ISOTYPES: GH-71246, K-262640, NY-1288073!, NY-1288074!, P-258516!, S-R-9444 [upper portion of mixed sheet], US-117669!)

***Psidium paucinerve*** Urb., Symb. Ant. 9: 82.1923. TYPE. Cuba. "prov. Oriente: prope Río Piloto in Sierra de Nipa [Nipe]," *Ekman 2505* (HOLOTYPE: B, lost; ISOTYPES: G-227722!, NY-1288076!, S-R-9441 [annotated as lectotype by Urquiola but perhaps never published].

***Psidium tenuirame*** Urb., Symb. Ant. 9: 83. 1923. TYPE. Cuba. "Prov. Oriente prope Papayo in collibus Mandinga dictis," *Ekman 9296* (HOLOTYPE: B, lost; ISOTYPES: HAC!, NY-1288091!, S-R-8387 [annotated as lectotype by Urquiola, 1997, but perhaps never published].

***Psidium balium*** Urb., Symb. Ant, 9: 84. 1923. TYPE. Cuba. "Prov. Oriente in Sierra Maestra non procul ad Río Yara in Collibus siccis cr. 600 m alt." *Ekman 5612* (HOLOTYPE: B, lost; ISOTYPES: G-227824!, NY-1288034!, S-R-8386 [annotated as lectotype by Urquiola, perhaps never published]).

***Psidium leonis*** Urb., Symb. Ant. 9: 464. 1928. TYPE. Cuba. "Prov. Oriente....Baracoa….prope Yauco [Jauco] in Mesa de Prada, 400-500 m alt." *León 12028* (HOLOTYPE: B, lost; ISOTYPES: GH-71244; NY-1288058!).

Tree or shrub up to ca. 4 m high, glabrous except for some floral structures, or in one population minutely hispid on young twigs and peduncles, the hairs minute (less than 0.1 mm long), whitish to reddish brown; young twigs gray, smooth, compressed, with age becoming terete, remaining smooth or becoming cracked and rougher, the bark becoming light reddish brown to light gray. LEAVES obovate, less often elliptic to oblanceolate, (1.5–)2–4(–5) cm long, 0.7–2.5 cm wide, 1.1–2.2 times as long as wide; apex rounded, obtuse, or emarginate; base cuneate to acuminate; petiole 1–3 mm long, 0.8–1.2 mm thick, slightly channeled above; venation brochidodromous, often obscure, the midvein nearly flat to raised above, prominent below; lateral veins more visible above than below, 4–6 pairs, usually leaving the midvein at an angle of 30–45 degrees; marginal vein when visible arching slightly between the laterals, usually within 2 mm the margin, closely following the margin, the weaker tertiary veins between the laterals dendritic, appearing to arise from the marginal vein; blades coriaceous, drying dark brown or gray, lustrous or not above, densely glandular on both surfaces, the margin somewhat revolute. FLOWER BUDS pyriform, restricted at junction of calyx and hypanthium, 6–9 mm long, the hypanthium obconic to infundibular, 2.5–4 mm long, the distal portion of bud ovoid to subglobose, 4–5 mm long; indumentum pattern of buds with all external and internal surfaces glabrous except for strigose inner surface of calyx, outer surface of petals, and staminal

ring of disk, the peduncle sometimes minutely hispid; peduncles 6–32 mm long, ca. 1 mm wide, uniflorous, or less often bearing dichasia, borne in the axils of leaves or at leafless nodes, slightly compressed at anthesis, terete at fruiting, the arms of the dichasia 5–20 mm long; bracteoles narrowly triangular, ca. 0.8 mm long, caducous before anthesis. CALYX closed or open by a small apical pore through which reddish brown hairs protrude, sometimes with weak longitudinal grooves along which calyx will tear in 2–4(–5?) parts at anthesis, the tears sometimes cutting the staminal ring, the calyx parts persisting after anthesis but mainly deciduous before fruiting; petals 4–5, suborbicular, ca. 7 mm long, densely covered with minute hairs without, the margin ciliate; disk with staminal ring 4–5 mm across, glabrous; stamens borne on inner surface of calyx tube, 80–255, ca. 5 mm long; anthers subglobose, ca. 0.5 mm long, with a terminal gland and 2–13 smaller glands below; style 6–8 mm long, sometimes with scattered hairs; ovary 2–4-locular, the walls sometime not completely sealed, the placenta peltate; ovules per locule 14–30, 1–2-seriate along edge of lamellae. FRUIT ovoid to subglobose, 7–20 mm long and wide, the fruit wall 1–5 mm thick; seeds to 4–34, 4–5 mm long, ovaloid to reniform, with rounded and flat sides. (Fig. 17).

**Representative specimens examined. CUBA. Granma**: Bartolomé Masó, Santo Domingo, Parque Nacional Turquino, Cima Pico Mella, Alto del Naranjo, (20.02°N, 76.90°W), 985 m, 7 Aug 2016 (st), *Flickinger 25* (ASU0322688). **Guantánamo**: Baracoa, valle del Río Maraví, (20.42°N, 74.58°W), 31 Mar 1970 (st), *Bisse 16987* (HAJB, JE); Yateras, Felicidad de Yateras, zona de Monte Cristi, (20.39°N, 74.92°W), 500 m, 23 Aug 1971 (fr), *Bisse 20212* (JE). **Holguín**: Palenque, Cuchillos de Toa, Cayo Fortuna, Río Toa, (20.52°N, 74.88°W), 31 Mar 1970 (fl), *Bisse 16764* (HAJB, JE); Moa, Playa de la Vaca, (20.69°N, 74.98°W), 12 Aug 1970 (fr), *Bisse & Lippold 17691* (HAJB, JE); Sierra del Cristal, entre Los Milos y La Corea, (20.55°N, 75.52°W), 640 m, 27 Aug 1909, *Figueiras 230* (HAJB, US); Sierra de Nipe, Loma la Mensura, (20.48°N, 75.81°W), 22 Apr 1940 *Carabia 3750* (NY); Mayarí, La Cueva, Sierra de Nipe, (20.51°N, 75.70°W), 392 m, 9 Aug 2016 (fr), *Flickinger et al. 35* (FTG); Mayarí, Loma de Bandera, Sierra de Nipe, (20.60°N, 75.72°W), 348 m, 11 Aug 2016 (st), *Flickinger et al. 50* (FTG); Moa, near Punta Gorda, (20.63°N, 74.86°W), 14 Jul 1947 (ofl), *León & Clemente 23020* (NY); Plancha Trail, Mensura to Woodfred, (20.55°N, 75.74°W), 4 Feb 1910 (fr), *Shafer 3878* (NY, US); Moa region, near port of Moa, (20.62°N, 74.95°W), 19 Jul 1951 (fr), *Webster 3827* (MICH). **Las Tunas**: Arroyo Corojo, Nagua, (20.84°N, 77.27°W), 20 Aug 1922 (fr), *Ekman 14909* (NY). **Pinar del Río**: Cajálbana, cuabales en la ladera sur, por el sendero del cuabal., (22.78°N, 83.45°W), 1 Jul 2000 (fl), *Urquiola 9180* (ASU0069456). **Santa Clara**: Manajanabo, Sierra Alta de Agabama, (22.30°N, 79.90°W), 26 Mar 1924 (fl), *Ekman 18861* (NY); 10 Km of Santa Clara, (22.31°N, 79.96°W), 30 Jun 1950 (yfr), *Howard 94* (MICH). **Santiago de Cuba**: Pinares de Mícara, Mayarí, (20.41°N, 75.54°W), 27 Dec 1955 *Alain & López Figueiras 4631* (HAJB, US); Sierra Maestra, Cobre range, Loma del Gato vicinity, (20.12°N, 75.68°W), 900 m, 30 Nov 1920 (ofl), *León, Clemente, & M. Roca 10211* (NY); Sierra de Nipe, Charrascales de Arroyo Potrero, Cayo Rey, (20.45°N, 75.92°W), 2 Oct 1956, *López 2825* (HAJB, US).

**Phenology**—Flowering mainly in April and May; fruiting mainly in July and August.

**Habitat and distribution**—Endemic to Cuba. Growing in charrascal, pine woodlands, savannas, and rainforests, on serpentine, ultrabasic, laterite, limestone rocks and soils, from near sea level to 900 m.

**Distinguishing features**—Leaves oblanceolate to obovate, generally over 2 cm long, 1–2.2 times as long as wide, the base acute, acuminate, or cuneate; peduncle 6–32 mm long; fruit ovoid to subglobose, 7–20 mm long and wide; seeds 4–5 mm long.

*Psidium parvifolium* may hybridize with, and may be confused with, *P. minutifolium*. See discussion under that species.

**14. *Psidium rotundatum*** Griseb., Cat. Pl. Cub. 92. 1866. TYPE. Cuba. "occ., in sylvis depressis pr. Toscano, Manglares," *Wright 2457* (HOLOTYPE: GOET-8275; ISOTYPES: BM-616946, BRU-72806, G-227661!, K-565284, MICH-1210408!, MO!, NY-1365083!, P-25812!, US-731228!, W-61640!).

***Psidium rotundatum*** var. ***triflorum*** Griseb., Cat. Pl. Cub. 92. 1866. TYPE. Cuba. "Bahia Honda," (22.9°N, 83.1°W), 1 Jan 1970 (fl), *Wright 2456* (HOLOTYPE: GOET; ISOTYPES: G-227659!, MO!, P-258511!, YU-66208).

***Psidium cymosum*** Urb., Symb. Ant. 9(4): 464. 1928. TYPE. Cuba. "Prov. Pinar del Río in Pinar de Cajálbana," *Ekman 17342* (HOLOTYPE: B, lost; ISOTYPES: A-71239, F-65686f, G-223329!, NY-1288043!, S-R-8390 [annotated as lectotype by Urquiola, but perhaps never published]).

Shrub or small tree up to 3 m high, most surfaces glabrous, minutely hispid on young growth, inner surface of calyx, outer surface of petals, and staminal ring, the leaves and flowers densely glandular; *hairs* reddish brown to whitish, mainly erect, less than 0.1 mm long; *young twigs* at first hispid, the hairs persisting or not until the first bark falls, the first bark becoming whitish, the older twigs usually whitish, the bark with inconspicuous cracks. LEAVES broadly elliptic to orbicular, 1.7–5.5 cm long, 1.5–4.5 cm wide, 0.8–1.4(–2) times as long as wide; *apex* rounded, emarginate, or less often acute; *base* rounded to cordate; *petiole* 1–2 mm long, 1–1.5 mm wide; *venation* brochidodromous, sometimes obscure, the midvein somewhat impressed to about flat to slightly impress or raised above, prominent below; lateral veins 4–6(–8), leaving the midvein at an angle of nearly 90 degrees near leaf base and about 45 degrees near apex, sometimes slightly raised above; marginal vein broadly arching between laterals, mostly within 1–5 mm of the margin; weaker dendritic tertiary veins alternating with laterals and appearing to arise from the marginal vein; *blades* subcoriaceous to coriaceous, lustrous to dull above, densely glandular, drying gray-green to dark brown above, often mottled with light gray areas above, lighter brown below, the margin often revolute. FLOWER BUDS pyriform, sometimes with an acuminate tip, restricted at the junction of the calyx and hypanthium, 4–6 mm long, the hypanthium obconic to infundibular, 1–2 mm long, the distal portion of bud ovoid to subglobose, 3–4 mm long; *indumentum pattern of buds* with all external and internal surfaces glabrous except for inner surface of calyx, outer surface of petals, and staminal ring of disk; *peduncles* 4–18 mm long, 0.5–0.8 mm wide, uniflorous, or bearing a 3-flowered dichasium, borne in the axils of leaves or bracts, or at leafless nodes, the arms of the dichasia ca. 0.5 cm long, the bracts triangular, ca. 1.5 mm long; *bracteoles* narrowly triangular, ca. 0.8–1.6 mm long. CALYX closed, or closed except for a minute apical pore through which reddish brown hairs protrude, tearing irregularly, usually in 2–4 persistent parts, the tears usually not cutting the staminal ring; *petals* 4 in buds seen, obovate, ca. 5 mm long, densely glandular, strigose without; *disk* within staminal ring, ca. 1.5 mm wide, glabrous; *stamens* 85–125, 4–5 mm long, borne on inner surface of staminal tube; *anthers* subglobose, ca. 0.5 mm long, with ca. 4 subequal glands; *style* 5–6 mm long, glandular; *ovary* 2-locular; *ovules* 4–10 per locule, uniseriate along the edge of the peltate placenta. FRUIT subglobose, to ellipsoid, 0.8–1.2(–1.5) cm long, yellow, sweet, the wall 1–2 mm thick; *seeds* 2–9, 4–5 mm long, with flat and rounded sides. (Fig. 18).

**CUBA**. **Artemisa**: `Pinar del Río', prope Morrillo in pascuis, (22.94°N, 83.31°W), 2 Sep 1923 (fr), *Ekman 17395* (G, NY, US); Cayajabos, Pelada de Buenavista, (22.86°N, 82.85°W), 650 m, 23 Mar 1929 *León 13863* (NY). **Pinar del Río**: Cajálbana, La Palma, (22.75°N, 83.55°W), 15 Jul 1950 (fl), *Alain & Clemente 1448* (US); Cajálbana, (22.79°N, 83.45°W), 16 May 1953, *Alain 3021* (US); Loma de Cajálbana, La Palma, (22.75°N, 83.55°W), 200 m, 1 Nov 1975, *Arces et al. 29060* (FR); Sierra de Órganos, grupo de Rosario, valley of Río Santa Cruz, (22.4°N, 84°W), 31 Mar 1923, *Ekman 16395* (MO, US); on Pan de Cajálbana, (22.79°N, 83.45°W), 6 Apr 1915, *León & Charles 4941* (NY); La Palma, Camino Reduan, próximo al Charco Burundanga, APRM Mil Cumbres, (22.80°N, 83.41°W), 94 m, 11 Jan 2016 (fl buds), *Oviedo, R. s.n.* (FTG); Sandino, San Ubaldo, Reserva Natural, (22.07°N, 84.02°W), 22 Sep 1999 (fr), *Urquiola 381* (FR). **Villa Clara**: Rangel, near Loma Pelada, (22.5°N, 79.9°W), 24 Oct 1925, *León 12532* (NY); Rosario Range, Rangel, Loma Zambumbia, (22.19°N, 79.98°W), 31 Mar 1937, *León 16822* (GH, NY).

**Phenology**—Flowering and fruiting throughout year but mainly flowering from May to July; fruiting mainly in August and September.

**Habitat and distribution**—Endemic to western Cuba. Growing in forests, savannas, pine woodlands, at edges of manglares, along streams, and gallery forest; in rocky areas often on serpentine soils; at 100–650 m.

**Distinguishing features**— Leaves broadly elliptic to orbicular, 1.7–5.5 cm long; lateral veins usually easily visible; dichasial inflorescences frequently present; flower buds pyriform, 4–6 mm long.

This species might be confused with *Psidium nummularia*. See discussion under that species.

**15. *Psidium salutare*** (Kunth) O. Berg, Linnaea 27: 356. 1856.

***Myrtus salutaris*** Kunth, Nov. Gen. Sp. [H. B. K.] 6: 132. 1823. TYPE. Venezuela. "Carichanam, ad ripam Orinoci", *Humboldt and Bonpland s.n.* (HOLOTYPE: P-679449; ISOTYPE: B [=B1263/11 photo at MICH]).

Subshrub or shrub up to ca. 1.5 m high (often less than 0.5 m high), with new shoots arising from a woody subterranean base or rhizome, with shoots often short lived, or in *Psidium salutare* var. *pohlianum* sometimes reaching tree size (up to 10 m high), glabrous, glabrous except for disk and calyx lobes within, or sparsely to moderately pubescent on young growth, or silvery lanate in one variety; *hairs* when present whitish, 0.3–1 mm long; *young twigs* glabrous to densely pubescent, reddish brown, becoming grayish, the older bark gray to reddish brown, becoming flaky. LEAVES opposite or alternate on some shoots (rarely ternate), ovate, lanceolate, elliptic, narrowly elliptic, obovate, oblanceolate, (1–)2–9 cm long, 0.6–5.5 cm wide, 1.4–5 times as long as wide, drying gray-green to reddish brown, the margin entire to somewhat revolute; *apex* obtuse, acute to acuminate, abruptly acuminate, sometimes apiculate; *base* cuneate, obtuse, or rounded; *petiole* 0–2(–3) mm long, 1–1.5(–2) mm wide; *venation* brochidodromous, the midvein normally flat or slightly raised above, prominent below, the lateral veins 5–12 pairs, prominent to scarcely visible, leaving the midvein at an angle of ca. 45 degrees or less, nearly straight, the marginal veins arching shallowly between laterals, equaling laterals in prominence, running 0.2–2 mm from the margin, the tertiary veins forming a dendritic pattern between the laterals, sometimes appearing to arise from the marginal vein or the midvein; *blades* stiffly coriaceous at maturity, drying reddish brown to gray-green, dull or lustrous above. FLOWER BUDS pyriform, 4–7 mm long, the hypanthium obconic to campanulate, 1–3 mm long, the distal portion subglobose, wider than long, 2.5–4.5 mm long; *indumentum pattern of buds* with all surfaces glabrous, glabrous except for disk and calyx lobes within, or sparsely to moderately pubescent or silvery lanate except for glabrous petals, disk, and style; *peduncles* axillary, uniflorous or triflorous, 0.4–3.5 cm long, 0.5–0.8 mm wide; *bracteoles* linear to lanceolate, deciduous or persisting, 2–9 mm long, 0.5–2 mm wide. CALYX open, bowl-like, tearing ca. 1 mm between the lobes at anthesis, the lobes broadly rounded to ovate-triangular, 0.5–5(–6) mm long, 2–3(–4) mm wide; *petals* obovate to suborbicular, 5–11 mm long; *disk* 3–4(–5) mm across; *stamens* 100–200, 5–12 mm long; *anthers* subglobose to oblong, 0.3–0.8 mm long, with 1–3 glands; *style* 5–8 mm long; *ovary* 2–3-locular; *ovules* 9–48 per locule, uniseriate or biseriate along edge of the placenta, this strongly to scarcely peltate. FRUIT globose to subglobose, 8–10 mm in diam.; *seeds* 4–20, 4–8 mm long, subovoid.

Landrum (2003) recognized four varieties of *Psidium salutare* in addition to var. *salutare*; all four of these are restricted to South America.

***Psidium salutare*** var. ***salutare***

***Psidium salutare*** (Kunth) O. Berg, Linnaea 27:356, as to type. 1856.

***Psidium guayabita*** A. Rich., Ess. Fl. Cub. 581. 1846. TYPE**.** Cuba. "Vuelta de Abajo," *Valenzuela s.n.* (LECTOTYPE: P-87092! [designated by Landrum, 2003], =ASU photo!; ISOLECTOTYPE: P-258510!).

***Myrtus sagraea*** O. Berg, Linnaea 30:710. 1860. TYPE. Cuba. without locality, *De la Sagra s.n.* (HOLOTYPE: P-258327!, =ASU photo!).

***Psidium guayabita*** var. ***oblongatum*** Griseb., Cat. Pl. Cub. 91. 1866. TYPE. Cuba. without locality, *Wright 2436* (HOLOTYPE: GOET; ISOTYPES: GH-71241, MICH!, MO!, NY-1365086!, NY-1365087!, =ASU photo!, P-258509!).

***Psidium guayabita*** var. ***angustifolium*** Griseb., Cat. Pl. Cub. 91. 1866. TYPE. Cuba. without locality, *Wright 2436a* (HOLOTYPE: GOET; ISOTYPE: GH-71240).

See Landrum 2022 for more complete synonymy.

Usually a subshrub less than 0.5 m high; leaves elliptic, lanceolate, oblanceolate, ovate, or obovate, 3–7 cm long, 1–3.3 cm wide, 1.6–3.2 times as long as wide, glabrous to moderately pubescent; venation obscure to moderately pronounced, the marginal vein usually about 1 mm from margin; apex usually without an apiculum; peduncle 1–5 cm long, uniflorous or triflorous; calyx-lobes shorter or longer than the calyx tube, acute to rounded. (Fig. 19).

**Representative specimens examined. CUBA**. **Isla de la Juventud**: Isla de Pinos, Nueva Gerona, Sierra la Cañada, (21.76°N, 82.92°W), 300 m, 26 Dec 1966 (st), *Bisse 765* (HAJB, JE); Nueva Gerona, (21.88°N, 82.81°W), without date (fl), *Jennings 29* (NY); Pines, San Juan, (21.73°N, 82.61°W), 25 Feb 1939 (fl), *León & Victorin 18893* (NY). **Pinar del Río**: Minas de Matahambre, pinares al oeste del pueblo en el camino viejo a Macurije, (22.58°N, 83.96°W), 100 m, 30 Mar 1982 (fl), *Bisse et al. 46641* (HAJB, JE); Viñales, Alturas de Pizarras de Sur, Torre del Control del Incendios Forestales, (22.61°N, 83.71°W), 19 Sep 1999 (fr), *Urquiola 270* (FR); San Juan y Martínez, (22.41°N, 83.85°W), 7 May 1988 (fl), *Urquiola et al. 4522* (ASU0005042); Mantua, (22.29°N, 84.29°W), 8 Nov 1990 (fr), *Urquiola et al. 6678* (ASU0005041).

**DOMINICAN REPUBLIC**. Sánchez Ramírez, Cotuí, (19.05°N, 70.15°W), 6 Sep 1952 (fr), *Jiménez 2433* (MICH, US); Puerto Plata, Campamento Los Pinos, Maimón, (19.80°N, 70.77°W), 250m. 31 May 1977 (fl), *Liogier 26657* (JBSD, NY).

**Phenology**—Flowering mainly from February to May; fruiting mainly from June to September.

**Habitat and distribution**—Pine woodlands and open areas, on sandy or rocky soils, sometimes acidic soils. *Psidium salutare* is a variable and widely distributed species ranging from Mexico, Cuba, and Hispaniola to temperate South America; *P. salutare* var. *salutare* has a similar range reaching as far south as Paraguay and Paraná, Brazil, while the other varieties recognized by Landrum (2003) are found from about Bahia, Brazil south to Uruguay and Argentina.

**Distinguishing features**—Usually a subshrub, sprouting from ground level after a fire or disturbance; calyx open in bud, with 5 distinguishable lobes, the globe of the closed corolla visible before the flower bud opens.

**16. *Psidium urquiolanum*** Landrum & Z. Acosta, Phytotaxa 618(2): 196. 2023. TYPE. CUBA. Guantánamo: Baracoa, al sur de la loma del Yunque, (20.34°N, 74.57°W), 9 Feb 1972 (fl), *Bisse 21450* (HOLOTYPE: HAJB-G-001291; ISOTYPES: HAJB-G-001292, JE!)

Shrub or small tree perhaps, mainly glabrous but with minute hairs on some young growth and inner surface of calyx, the leaves and external surfaces of flowers densely glandular; *hairs* reddish brown, up to ca. 0.2 mm long; *young twigs* compressed to subterete, unwinged, glabrous to densely puberulent. LEAVES elliptic, oblong, obovate, or oblanceolate, (2.5–)3–8.7 cm long, (1.5–)2–4.2 cm wide, 1.3–2.3 times as long as wide; *apex* rounded to obtuse, sometimes emarginate; *base* rounded, cuneate, or broadly cuneate; *petiole* 2–4 mm long, 1.5–2 mm thick; *venation* brochidodromous, obscure to faintly visible, the midvein impressed or nearly flat above, prominent below, the lateral veins 4–6 pairs, leaving the midvein at an angle of 45–60 degrees, the marginal vein following the margin, arching slightly between laterals, mainly running between 1 and 4 mm from margin, the tertiary veins rarely clear, dendritic, appearing to arise from the marginal vein; *blades* coriaceous, drying dark reddish-brown, densely glandular above and below, dull to slightly lustrous above and below, the margin revolute. FLOWER BUDS pyriform, 5–7 mm long, glabrous, densely and conspicuously glandular, the hypanthium ovoid to subcylindrical, 3–4 mm long, the distal portion of bud subglobose, 2–3 mm long; *indumentum pattern of buds* with all external surfaces glabrous, the inner surface of calyx and staminal ring minutely puberulent, the hairs mainly appressed; *peduncles* 1-flowered, (2–)4–20 mm long, 0.8–1 mm wide, flattened or subterete, borne in the axils of leaves, or small bracts, often grouped together in short bracteate shoots, these usually at the tips of branches, but sometimes at the base of a young leafy shoot, the buds often of various sizes and stages of maturity in a single inflorescence, the bracts ovate to triangular, ca. 1–1.5 mm long; *bracteoles* narrowly triangular, ca. 1 mm long. CALYX closed in bud, with a terminal pore through which minute reddish brown hairs emerge, usually tearing in 4 nearly equal, subtriangular lobes, these 3–5 mm long, ca. 3 mm wide, the tears between lobes not cutting deeply into the staminal ring; *petals* 5, suborbicular, not persisting; *disk* 3–4 mm across, the staminal ring densely puberulent, 1–2 mm wide, the disk within staminal ring, sparsely pubescent to glabrous; *stamens* ca. 100; *anthers* ca. 0.5 mm long, with a terminal gland and a few smaller glands below; *style* 3–5 mm long, glabrous, glandular; *ovary* 2–4-locular; *ovules* 16–20 per locule, mainly uniseriate, the placenta peltate. FRUIT globose, ca.1 cm wide; *seeds* ca. 7, lenticular to reniform, somewhat flattened, ca. 4 mm long, the seed coat several cells thick at narrowest point, the embryo ca. 2 mm long in curved state. (Fig. 20).

**Representative specimens examined**. **CUBA. Guantánamo**: Baracoa, alto entre Loma del Mirador y Loma de Buena Vista (al oeste de Camarones), (20.44°N, 74.60°W), 500 m, 6 Aug 1975 (fl), *Álvarez et al. 27136a* (HAJB, JE), (fr), *Álvarez, A. et al. 27137* (HAJB, JE); cabezada del Río Naranjo, (20.44°N, 74.69°W), 27 Feb 1975, *Álvarez et al. 27136b* (HAJB); Baracoa, camino de Los Naranjos a la Loma de Buenavista, (20.45°N, 74.65°W), 200 m, 21 Jan 1977 (fl), *Álvarez et al. 33784* (HAJB, JE); camino a Vega de la Palma, orillas de Arroyo Blanco, (20.33°N, 74.63°W), 27 Feb 1979, *Areces et al. 40095* (HAJB); Baracoa, valle al noroeste del Yunque de Baracoa, (20.34°N, 74.55°W), 31 Jan 1968 (bud), *Bisse & Kohler 5291* (JE); Baracoa, altiplano de la Mina Iberia, (20.46°N, 74.73°W), 600 m, 29 Feb 1968 (fr), *Bisse 6818* (JE); Baracoa, valle del Río Maraví, (20.42°N, 74.58°W), 31 Mar 1970 (st), *Bisse 16967* (HAJB, JE); Baracoa, al sur de la Loma del Yunque, (20.34°N, 74.55°W), 300 m, 31 Mar 1970 (ofl), *Bisse 17073* (JE); Baracoa, orillas del Río Báez, cerca del campamento `Los Naranjos`, (20.45°N, 74.58°W), 1 Aug 1975 (fl), *Bisse 27000* (HAJB, JE). **Holguín**: Moa, Cuchillas de Moa, alrededores del aserrío La Melba, (20.45°N, 74.82°W), 28 Apr 1980 (fl), *Álvarez et al. 42244* (HAJB, JE); Moa, orillas del Río Jiguani, cerca del segundo aserrio de La Melba, (20.45°N, 74.82°W), 31 Mar 1968 (bud), *Bisse & Kohler, E. 6774* (HAJB, JE); Moa, La Melba, (20.45°N, 74.82°W), 27 Dec 1968 (bud, fl), *Bisse & Lippold 11888* (HAJB, JE); charrascal de Cayo Guam, Moa, al W del campismo, (20.58°N, 74.86°W), 30 Jun 1991 (yfr), *Urquiola 7108* (ASU0060189).

**Phenology**—Phenology is not well known; flowering in January, April, August and December; fruiting in March and August.

**Habitat and distribution**—Endemic to eastern Cuba; charrascal, rain forest, and cloud forest at 200 to 700 m.

**Distinguishing features**— Leaves mostly elliptic, obovate, or oblanceolate, (2.5–)3–8.7 cm long; flower buds 5–7 mm long, with the calyx closed except for a small terminal pore.

**ACCEPTED SPECIES NAMES (IN BOLD) AND SYNONYMS**

*Calycorectes protractus* Griseb. =***Psidium oligospermum***

*Calyptrogenia biflora* Alain =***Psidium amplexicaule***

*Calyptropsidium sintenisii* Kiaerskou =***Psidium oligospermum***

*Eugenia nummularia* Wright ex Griseb. =***Psidium nummularia***

*Guajava amplexicaulis* (Persoon) Kuntze =***Psidium amplexicaule***

*Guajava montana* (Sw.) Kuntze Rev. Gen. 1: 240. 1891. =***Psidium montanum*** Sw.

*Marlierea marlierea leal-costae* G. M. Barroso & Peixoto =***Psidium amplexicaule***

*Mitranthes sartoriana* O. Berg =***Psidium oligospermum***

*Mitropsidium sartorianum* (Berg) Burret =***Psidium oligospermum***

*Mitropsidium sintenisii* (Kiaerskou) Burret =***Psidium oligospermum***

*Myrtus sagraea* Berg =***Psidium salutare*** var. ***salutare***

*Myrtus salutaris* Kunth =***Psidium salutare*** var. ***salutare***

***Psidium acranthum*** Urb.

*Psidium acunae* Borhidi =***Psidium nummularia***

***Psidium albescens*** Urb.

***Psidium amplexicaule*** Persoon

*Psidium balium* Urb. =***Psidium parvifolium***

*Psidium brevifolium* Alain =***Psidium acranthum***

*Psidium calyptranthoides* Alain =***Psidium oligospermum***

***Psidium cattleyanum*** Sabine

*Psidium celastroides* Urb. =***Psidium nummularia***

*Psidium claraense* Urb. =***Psidium oligospermum***

*Psidium cordatum* Sims =**Psidium amplexicaule**

*Psidium cymosum* Urb. =***Psidium rotundatum***

*Psidium dictyophyllum* Urb. & Ekman =***Psidium amplexicaule***

*Psidium dumetorum* Proctor =***Psidium amplexicaule***

*Psidium galapagaeum* Hook. f. =***Psidium oligospermum***

***Psidium guajava*** L.

*Psidium guayabita* Richard =***Psidium salutare*** var. ***salutare***

*Psidium guayabita* var. *angustifolia* Griseb. =***Psidium salutare*** var. ***salutare***

*Psidium guayabita* var. *oblongata* Griseb. =***Psidium salutare*** var. ***salutare***

***Psidium guineense*** Sw.

*Psidium haitiense* Alain =***Psidium acranthum***

***Psidium harrisianum*** Urb.

*Psidium hotteanum* Urb. & Ekman =***Psidium acranthum***

*Psidium jakucsianum* Borhidi =***Psidium minutifolium***

*Psidium leonis* Urb. =***Psidium parvifolium***

*Psidium microphyllum* Britton =***Psidium oligospermum***

***Psidium minutifolium*** Krug & Urb.

***Psidium montanum*** Sw.

***Psidium nannophyllum*** Alain

*Psidium nitidum* Wright =***Psidium parvifolium***

***Psidium nummularia*** (Wright ex Griseb.) Wright

***Psidium oligospermum*** DC.

***Psidium parvifolium*** Griseb.

*Psidium parvifolium* var. *planifolium* Krug & Urb. =***Psidium parvifolium***

*Psidium paucinerve* Urb. =***Psidium parvifolium***

***Psidium rotundatum*** Griseb.

*Psidium rotundatum* var. *triflorum* Griseb. =***Psidium rotundatum***

***Psidium salutare*** (H. B. K.) Berg var. ***salutare***

*Psidium sartorianum* (O. Berg) Niedenzu =***Psidium oligospermum***

*Psidium scopulorum* Ekman & Urb. =***Psidium nummularia***

*Psidium sessilifolium* Alain =***Psidium amplexicaule***

*Psidium sintenisii* (Kiaersk.) Alain =***Psidium oligospermum***

*Psidium tenuirame* Urb. =***Psidium parvifolium***

*Psidium tomasianum* Urb. & Ekman =***Psidium nummularia***

*Psidium trilobum* Urb. & Ekman =***Psidium acranthum***

*Psidium wrightii* D. Don ex Wright =***Psidium montanum***

***Psidium urquiolanum*** Landrum & Z. Acosta

*Psidium yucatanense* Lundell =***Psidium oligospermum***

**EXCLUDED OR DOUBTFUL SPECIES**

*Calyptropsidium ekmanii* Urb., Ark. Bot. 24A(4): 17. 1931. TYPE. Haiti. "Massif de la Hotte in parte occidentali prope Les Anglais in Morne l'Etang", 21 Jul 1928 (fl), *Ekman H10360* (LECTOTYPE: S-10-6265, designated by Flickinger [Flickinger et al. 2020]). ≡ *Eugenia burretii* Flickinger, Taxon 69(3): 469. 2020.

*Psidium araneosum* Urb., Repert. Spec. Nov. Regni Veg. 19: 304. 1924. TYPE. Cuba. "Prov. Oriente prope Baracoa ad Maraví", *Ekman 4027* (HOLOTYPE: B, lost; ISOTYPE: NY-1288032!-fragment). ≡ *Mosiera araneosa* (Urb.) Bisse, Revista Jard. Bot. Nac. Univ. Habana 6(3): 5. 1985.

*Psidium bahorucanum* Alain & R. García, Moscosoa 9: 12–17. 1997. TYPE. Dominican Republic. Prov. Independencia: Sierra de Bahoruco, approx. 12 km al S de Duvergé, Monte Palma, 800 m, 24 Mar 1993 (fr), *R. García, G. Caminero, D. Höner 4478* (HOLOTYPE: BRIT-23964; ISOTYPES: ASU-0019296!, MO-313593, NY-76858, S-R-10929). =*Eugenia*.

*Psidium berteroanum* O. Berg, Linnaea 27(2–3): 374. 1856. TYPE. Puerto Rico. *Bertero 206.* Sterile specimen in Herbarium of Sprengel. Not found. Compared to *Psidium montanum* by Berg but considered distinct by him.

*Psidium bullatum* Britton & P. Wilson, Mem. Torrey Bot. Club 16: 85. 1920. TYPE. Cuba. Camagüey, Santa Clara, *Britton & Cowell 13328* (HOLOTYPE: NY-3376846, viewed at NY website; ISOTYPES: GH-375217!, US-117655!) ≡ *Mosiera bullata* (Britton & P. Wilson) Bisse, Revista Jard. Bot. Nac. Univ. Habana 6(3): 5. 1985.

*Psidium cacuminis* Britton & P. Wilson, Bull. Torrey Bot. Club 50: 43. 1923. TYPE. Cuba. Pico Turquino, *Ekman 10749* (HOLOTYPE: NY-1288037!) =*Eugenia maestrensis* Urb., Symb. Antill. (Urban). 9(1): 107. 1923, according to Govaerts et al. (2008).

*Psidium calycolpoides* Griseb., Pl. Wright. (Griseb.) 1: 183. 1860. TYPE. Cuba. *Wright 1195 & 1196* (SYNTYPES: GOET-13807!, GOET-13811!) ≡ *Mosiera calycolpoides* (Griseb.) Borhidi, Acta Bot. Hung. 37(1–4): 78. 1992.

*Psidium confertum* R. A. Howard, J. Arnold Arbor. 28: 123. 1947. Type. Cuba. "near airfield at Moa", *Howard 5901* (HOLOTYPE: A-00069288) =*Mosiera ophiticola* (Britton) Bisse, Revista Jard. Bot. Nac. Univ. Habana 6(3): 5. 1985.

*Psidium cordatum* var. *parvifolium* Griseb., Cat. Pl. Cub. 91. 1866. TYPE. Cuba. *Wright 2455* (HOLOTYPE: GOET) ≡ *Psidium wrightii* Krug & Urb., Bot. Jahrb. Syst. 19(4): 570. 1894, nom. illeg. (non *Psidium wrightii* Lamb. ex W. Wright, Memoir W. Wright 278. 1828.) ≡ *Psidium parvifolium* (Griseb.) Mabb., Taxon 30(1): 12. 1981, nom. illeg. (non *Psidium parvifolium* Griseb., Cat. Pl. Cub. 91, 285. 1866.) ≡ *Mosiera wrightii* Borhidi, Acta Bot. Hung. 37(1–4): 79. 1992.

*Psidium crenulatum* Urb. & Ekman, Symb. Antill. (Urban). 9(4): 460. 1928. TYPE. Cuba. "Prov. Santa Clara prope Casilda", *Ekman 18889* (HOLOTYPE: B, lost; ISOTYPE: NY-1288042!) =*Mosiera bullata* (Britton & P. Wilson) Bisse, Revista Jard. Bot. Nac. Univ. Habana 6(3): 5. 1985.

*Psidium crispulum* Urb., Ark. Bot. 17(7): 44. 1921. TYPE. Haiti. "Morne de la Hotte in declivibus australibus montium occidentalium ad Ma Blanche". TYPE. *Ekman H598* (HOLOTYPE: B, lost; LECTOTYPE: S-05-3128, designated by Flickinger [Flickinger et al. 2020]) ≡ *Eugenia crispula* (Urb.) Flickinger, Taxon 69(3): 469. 2020.

*Psidium cuspidatum* Alain, Brittonia 20: 159. 1968), (non *Psidium cuspidatum* (O. Berg) Burret, Notizbl. Bot. Gart. Berlin-Dahlem 15: 483. 1941.) TYPE. Dominican Republic. "Boca de Infierno, Los Haitises, Samana Prov.", 24 Jun 1930 (fr), *Ekman H15427* (HOLOTYPE: US-117657) ≡ *Mosiera cuspidata* Salywon, J. Bot. Res. Inst. Texas 1(2): 899. 2007.

*Psidium fragrans* Macfad.?, Fl. Jamaica 2: 108. 1850. Jamaica. "Salt Hill, Port Royal Mountains," *Macfadyen s.n.* (no specimen found). Might be *P. montanum* or some other species of *Psidium*.

*Psidium gracilipes* Alain, Phytologia 25: 269. 1973. TYPE. Dominican Republic. "Loma Redonda, Ciénaga de la Culata, Constanza", 1700-2000 m, 30 Nov 1969, *Liogier 17138* (HOLOTYPE: NY; ISOTYPES: JBSD!, US-1920027) ≡ *Mosiera gracilipes* (Alain) Salywon, J. Bot. Res. Inst. Texas 1(2): 899. 2007.

*Psidium havanense* Urb., Symb. Antill. (Urban). 9(4): 461. 1928. TYPE. Cuba. "Prov. Habana in Loma Coca solo serpentino", 18 Jun 1922 (bud), *Ekman 14061* (HOLOTYPE: B, lost; ISOTYPES: A-69290!, BM-616930, G-222533) ≡*Mosiera havanensis* (Urb.) Bisse, Revista Jard. Bot. Nac. Univ. Habana 6(3): 4. 1985.

*Psidium insulanum* Alain, Phytologia 47: 187. 1980. TYPE. Puerto Rico, Vieques Island, East Point, 24 May 1978 (yfr), *Woodbury s.n.* (HOLOTYPE: UPR; ISOTYPES: NY-1795717, US-1050093) =*Mosiera longipes* Small, Man. S. E. Fl. [Small]: 937. 1933*).*

*Psidium jackii* Urb., Symb. Antill. (Urban). 9(4): 467. 1928. TYPE. Cuba. "Prov. Oriente in Sierra Maestra....ad Arroyo del Cristo in Río Yara", *Ekman 14751* (HOLOTYPE: B, lost; ISOTYPE: S-R-8389! [seen at S site]) =*Mosiera calycolpoides* (Griseb.) Borhidi, Acta Bot. Hung. 37(1–4): 78. 1992.

*Psidium leiophloeum* (Urb.) Urb., Symb. Antill. (Urban). 9(4): 459. 1928. ≡ *Eugenia leiophloea* Urb., Symb. Antill. (Urban). 9(1): 108. 1923. (TYPE. Cuba. "Prov. Oriente in Sierra de Nipe ad Río Piedra in charrascales 200 m alta et supra", *Ekman 10012* (HOLOTYPE: B lost; ISOTYPE: S-R-8366! [at S site]) =*Mosiera bullata* (Britton & P. Wilson) Bisse, Revista Jard. Bot. Nac. Univ. Habana 6(3): 5. 1985.

*Psidium longipes* (O. Berg) McVaugh, J. Arnold Arbor. 54: 312. 1973. ≡ *Eugenia longipes* O. Berg, Linnaea 27(2): 150. 1856. ≡ *Mosiera longipes* Small, Man. S. E. Fl. [Small] 937. 1933. TYPE. United States. Florida. *Leitner* [ex Salywon 2003] *"Cabanis" s.n.* (HOLOTYPE: B, lost).

*Psidium longipes* var. *orbiculare* (O. Berg) McVaugh, J. Arnold Arbor. 54: 314. 1973. ≡ *Eugenia orbicularis* O. Berg, Linnaea 30: 678. 1861. TYPE. "in insula Barbados….in herb Rich.", *L. Cl. Rich. s.n.* (HOLOTYPE: P-258322).

*Psidium loustalotii* Britton & P. Wilson, Bull. Torrey Bot. Club 48: 342. 1922. TYPE. "Sabana de Motembo, Santa Clara, Cuba." *León & Loustalot 9394* (HOLOTYPE: NY, not found). = *Ottoschmidtia microphylla* (Griseb.) Urb. (Rubiaceae) Ark. Bot. 21A(5): 85. 1927. ≡ *Stenostomum microphyllum* Griseb. Cat. Pl. Cub. 133. 1866. TYPE. Cuba. Prov. Pinar del Rio, San Marcos, *Wright 3184* (HOLOTYPE: GOET, ISOTYPES: GH, HAC!, US-138403)

*Psidium moense* (Britton & P. Wilson) McVaugh, J. Arnold Arbor. 54: 313. 1973. ≡ *Eugenia moensis* Britton & P. Wilson, Mem. Torrey Bot. Club 16: 88. 1920. ≡ *Mosiera moensis* (Britton & P. Wilson) Bisse, Revista Jard. Bot. Nac. Univ. Habana 6(3): 4. 1985. TYPE. Cuba. "Camp La Gloria, south of Sierra Moa, Oriente", December 24-30, 1910 (yfr), *J. A. Shafer 8100* (HOLOTYPE: NY-84753; ISOTYPE: US-118065).

*Psidium munizianum* Borhidi, Acta Bot. Acad. Sci. Hung. 21: 225. 1975. TYPE. Cuba. "Prov. Habana; in fruticetis litoralibus La Rotila pr. pag. Santa Cruz del Norte", 10 Oct 1959, *Alain 6805* (HOLOTYPE: HAC!). Compared by Borhidi to *P. crenulatum*, which equals *Mosiera bullata*. =*Mosiera bullata*?

*Psidium navasense* Britton & P. Wilson, Mem. Torrey Bot. Club 16: 85. 1920. TYPE. Cuba. "Between Navas and Camp Buena Vista, Oriente, 650 m", 23 Mar 1910, *J. A. Shafer 4444* (HOLOTYPE: NY-1288063!). =*Eugenia*?

*Psidium nummularioides* Britton & P. Wilson, Mem. Torrey Bot. Club 16: 85. 1920. ≡ *Mosiera nummularioides* (Britton & P. Wilson) Bisse, Revista Jard. Bot. Nac. Univ. Habana 6(3): 5. 1986. TYPE. Cuba. "Guantanamo Bay, Oriente", *Britton 2046* (HOLOTYPE: NY; ISOTYPE: US-731223).

*Psidium ophiticola* Britton & P. Wilson, Mem. Torrey Bot. Club 16(2): 86. 1920. ≡ *Mosiera ophiticola* (Britton & P. Wilson) Bisse, Revista Jard. Bot. Nac. Univ. Habana 6(3): 5. 1985. TYPE. Cuba. "near mouth of the Río Yamanigüey, Oriente", *J. A. Shafer 4278* (HOLOTYPE: NY-4205531-seen at NY virtual herbarium).

*Psidium orbifolium* Urb., Symb. Ant. 9: 462. 1928. TYPE. Cuba. "Prov. Oriente in Sierra Maestra in sylvis ad rivulum Corojo prope Nagua," *Ekman 14922* (HOLOTYPE: B, lost; ISOTYPES: G-227728!, HAC!, NY-1288068!, NY-1288069!, S-R-8383 [annotated as lectotype by Urquiola, 1997, but perhaps never published]).[Compared to *P. rotudatum* by Urban, but probably not that species, type sterile]. Could be another genus.

*Psidium pulverulentum* Krug & Urb., Bot. Jahrb. Syst. 19(4): 567. 1894. =*Guapira obtusata* (Jacq.) Little Phytologia 17: 368. 1968 (Nyctaginaceae) according to Acevedo & Strong (2012).

*Psidium reversum* Urb., Symb. Antill. (Urban). 9(1): 84. 1923. ≡ *Calycolpus reversus* (Urb.) Bisse, Revista Jard. Bot. Nac. Univ. Habana 4(1): 6. 1983. . ≡ *Eugenia reversa* (Urb.) Z.Acosta & García-Beltrán, Phytotaxa 644(4): 295. 2024. TYPE. Cuba. "Prov. Oriente prope Baracoa in Lomas de Cuaba", *Ekman 4295* (HOLOTYPE: B: lost; LECTOTYPE: NY-1288080!, designated by Landrum [2010]).

*Psidium saxicola* Britton & P. Wilson, Mem. Torrey Bot. Club 16: 86. 1920. TYPE. Cuba. Santiago Bay, Oriente…El Morro, *Britton and Cowell 12544* (HOLOTYPE: NY-3376848; ISOTYPES: F-361158, GH-375222, US-117678). =*Myrtus elliptica* C. Wright, Anales Real Acad. Ci. Méd. Fís. Nat. Habana Revista Ci. 5: 410. 1868. ≡ *Mosiera elliptica* (C. Wright) Bisse, Revista Jard. Bot. Nac. Univ. Habana 6(3): 5. 1985.

*Psidium versicolor* Urb., Symb. Antill. (Urban). 9(1): 85. 1923. TYPE. Cuba. "Prov. Oriente in Sierra de Nipe ad Río Piedra", *Ekman 4811* (HOLOTYPE: B, lost; ISOTYPE: S-R-8381, marked "Lectotype" by Urquiola but probably not yet published). =*Mosiera calycolpoides* (Griseb.) Borhidi, Acta Bot. Hung. 37(1–4): 78. 1992.

*Psidium vicentinum* Urb., Symb. Antill. (Urban). 9(4): 463. 1928. TYPE. Cuba. "Prov. Pinar del Río in Sierra de San Vicente (de Viña) in declivibus umbrosis prope dorsum montis", *Ekman 18692* (HOLOTYPE: B, lost; ISOTYPE: S-R-8379) =*Eugenia cristata* C. Wright, Fl. Cub. (Sauvalle) 41. 1869. [ex Urquiola annotation of isotype.]

*Psidium wrightii* Krug & Urb., (non *Psidium wrightii* Lamb. ex W.Wright, Memoir W. Wright 278. 1828. ≡ *Mosiera wrightii* Borhidi, Acta Bot. Hung. 37(1–4): 79. 1992. See *Psidium cordatum* var. *parvifolium* Griseb. above.

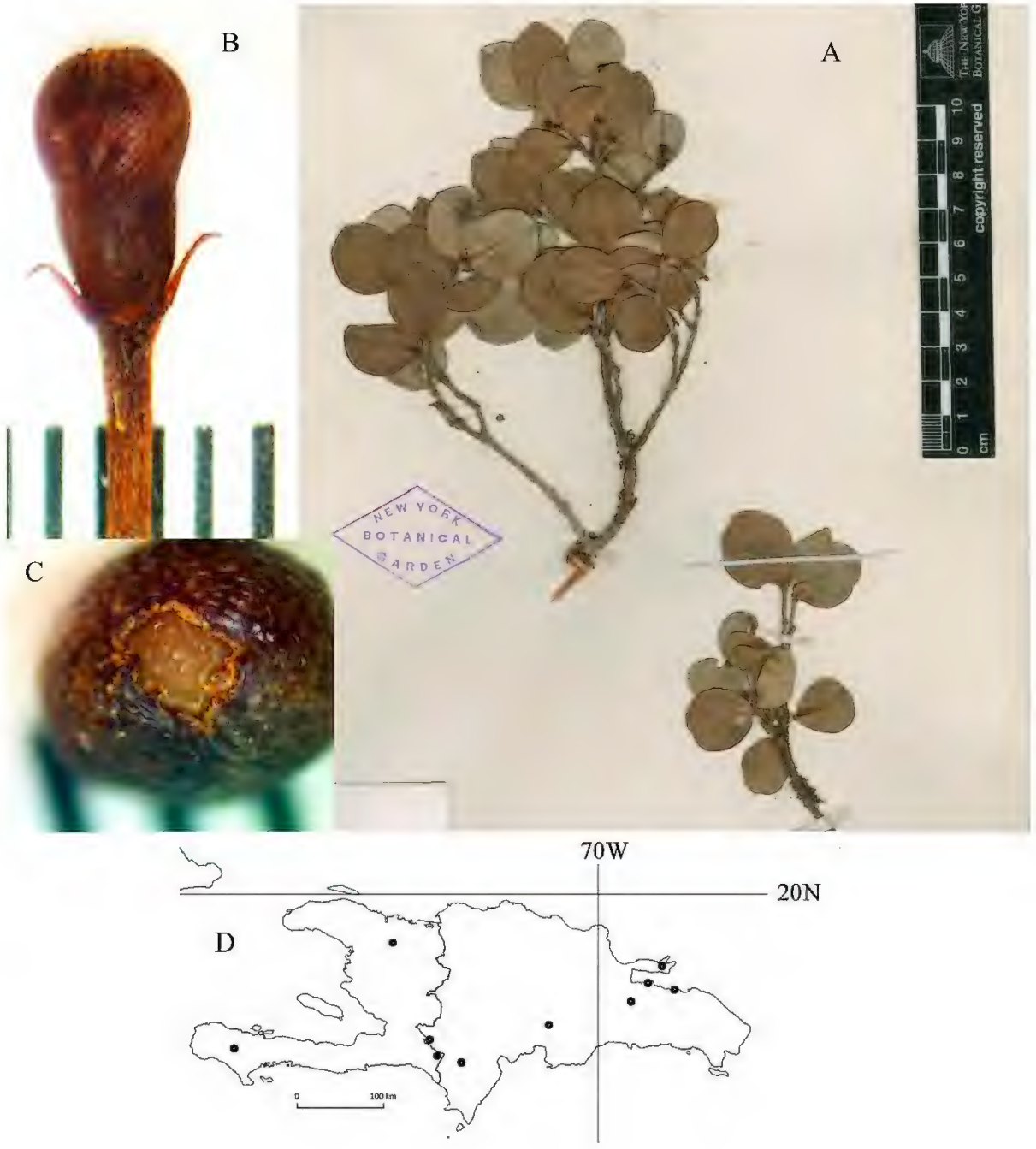


**Figure 3.** *Psidium. acranthum*: **A**. Herbarium sheet, isotype. **B**. Side view of closed flower bud. **C**. Apical view of closed flower bud. **D**. Map of distribution. (A from *Abbott 1247*, NY; B & C from *García et al. 4447,* ASU).

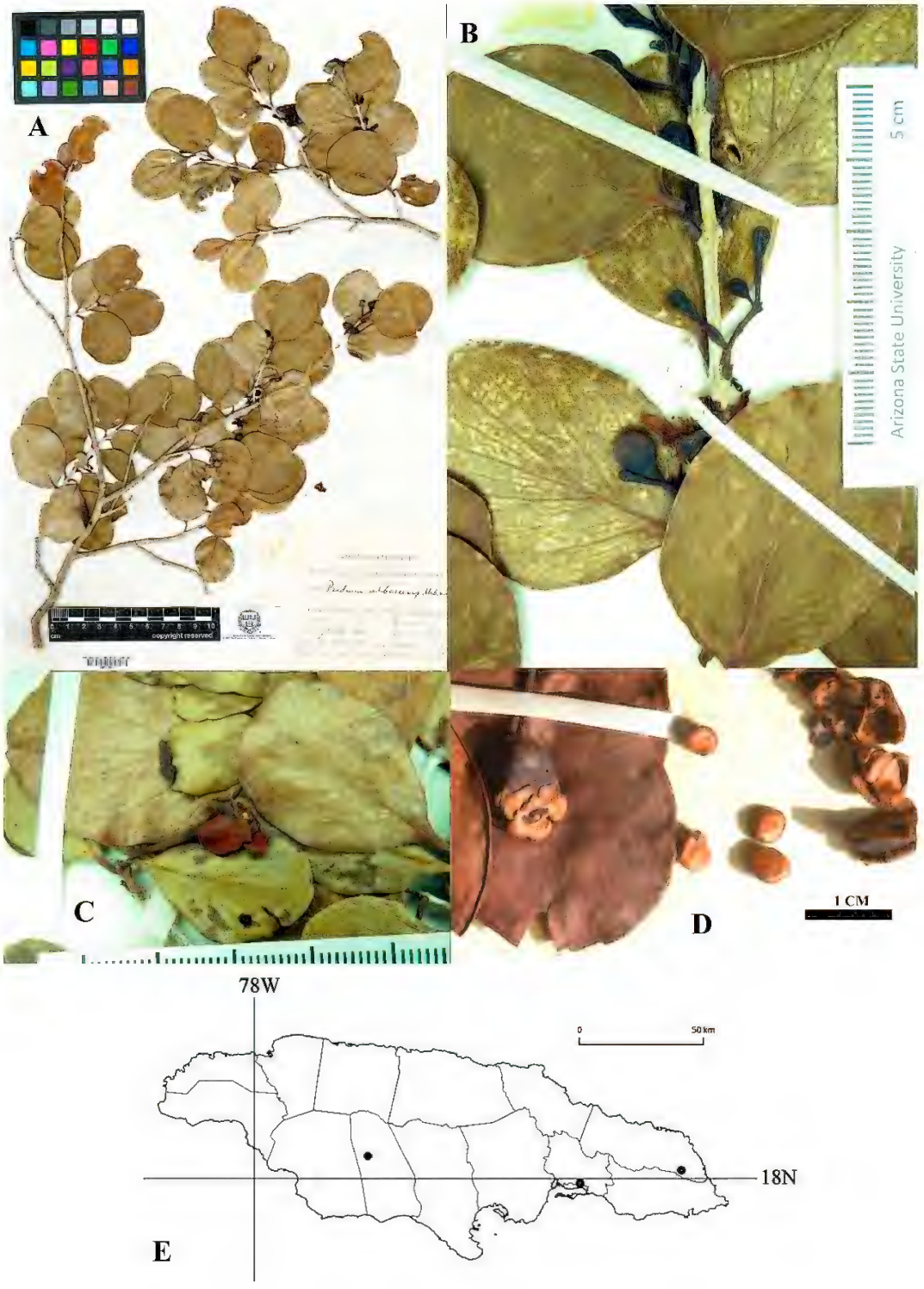


**Figure 4.** *Psidium albescens*: **A**. Herbarium sheet, isotype (*Harris 9583*). **B**. Twig with leaves and flower buds. **C**. Leaves with flower past anthesis showing reddish brown indumentum on inner surface of calyx. **D**. Fruits opened and closed; seeds from open fruit. **E**. Map of distribution. (A from isotype, A; B,C from isotype, NY; D from *Proctor 14836* at IJ, photo by K. Campbell).

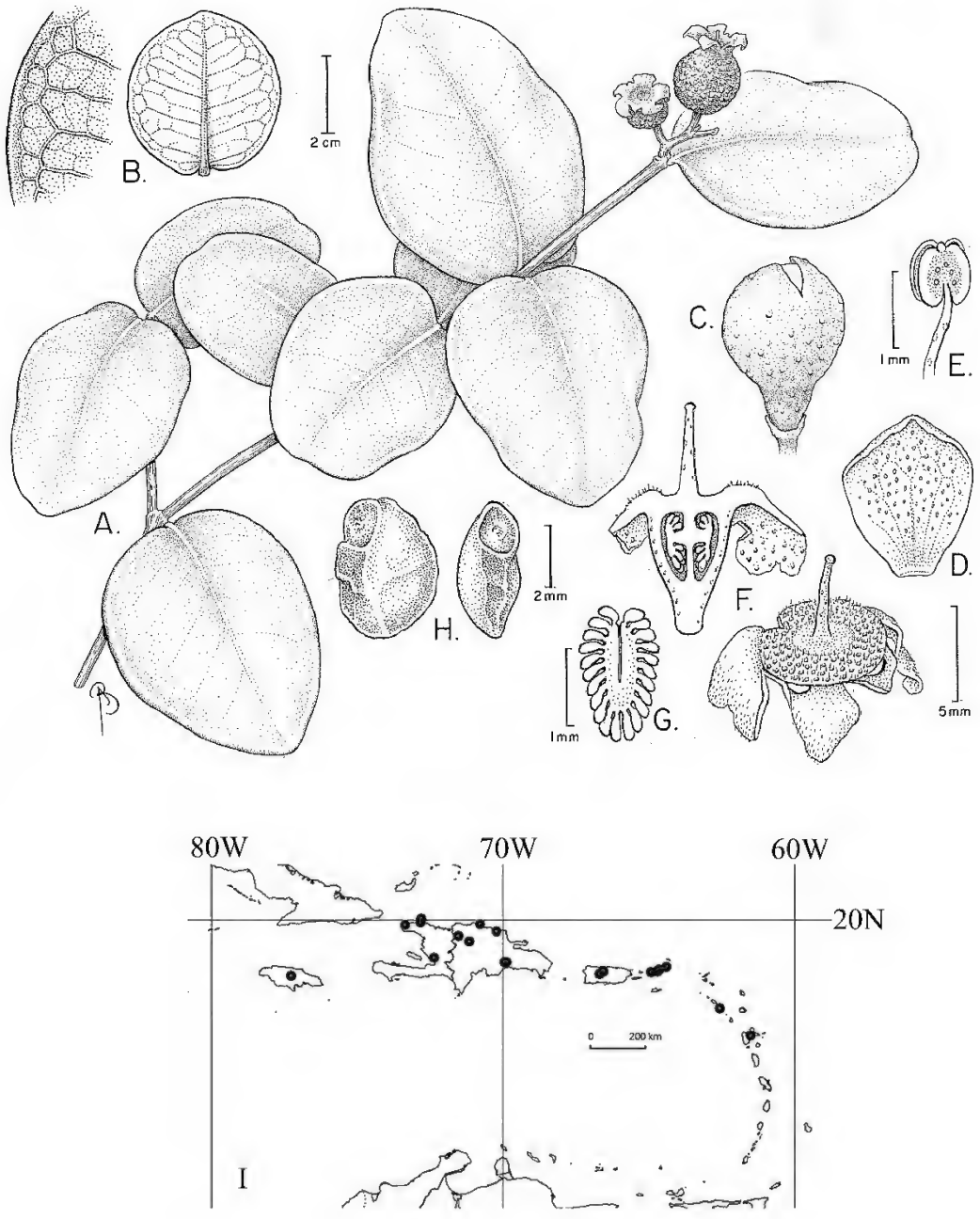


**Figure 5.** *Psidium amplexicaule*: **A.** Fruiting twig. **B**. Leaf with close-up of venation. **C**. Opening flower bud. **D**. Petal. **E**. Anther with terminal gland and smaller glands below. **F**. Distal view of flower after anthesis and longitudinal section of the same showing peltate placenta from side. **G**. View of peltate placenta and ovules. **H**. Two views of a seed**. I.** Map of distribution in Caribbean. (A, from *Acevedo-Rodríguez 2673*, NY; B, H, from *Mejía and Zanoni 7878*, ASU; C, from *Acevedo-Rodríguez 2862*, NY; D–G, from *Peguero et al. 1370*, ASU). Illustration by Bobbi Angell, modified from Acevedo-Rodríguez 1996, Fig. 154.

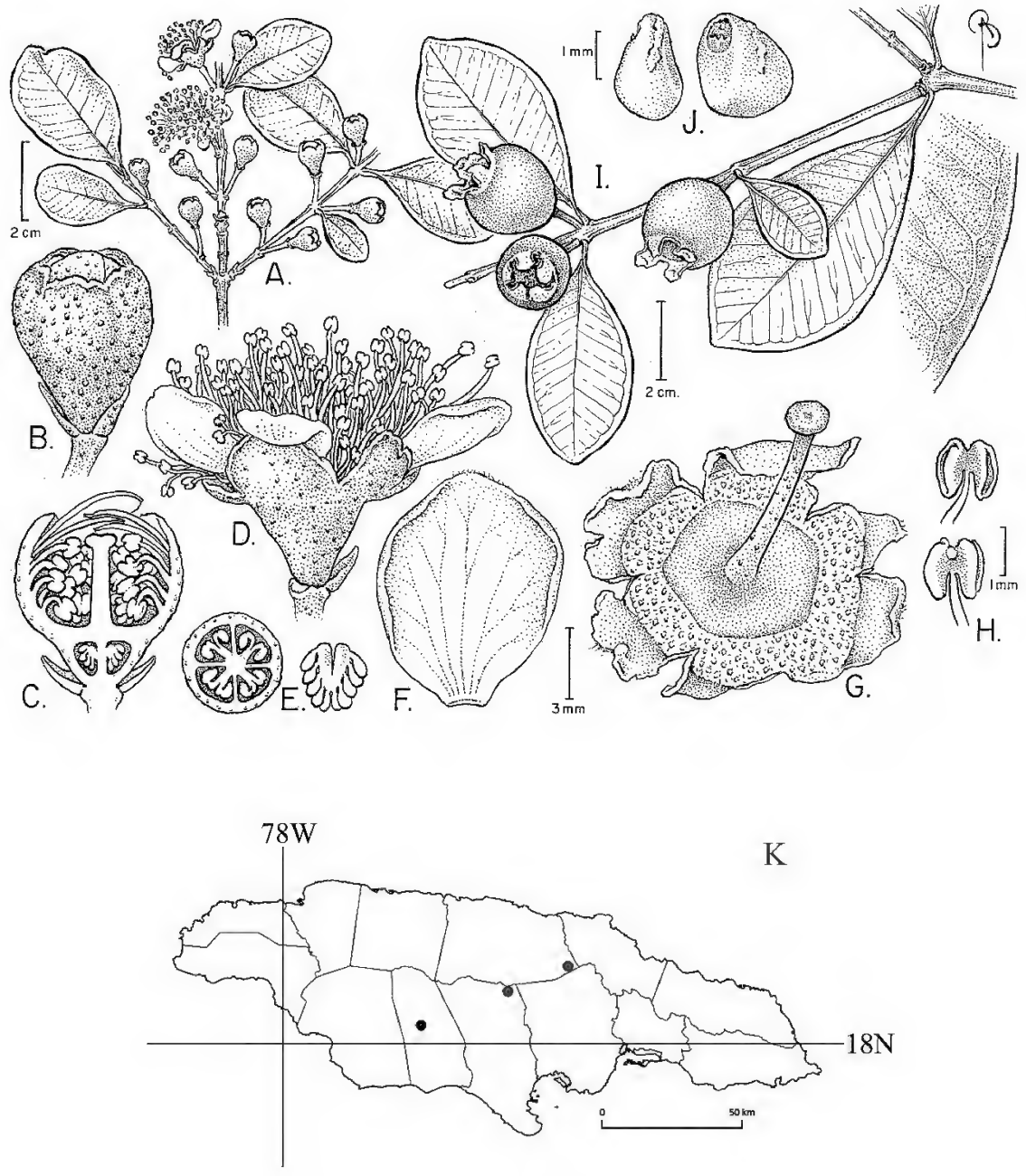


**Figure 6**. *Psidium cattleyanum*: **A**. Twig at beginning of anthesis. **B**. Flower bud. **C**. Longitudinal section of flower bud. **D**. Opening flower. **E**. Cross section of ovary and extracted placenta with ovules. **F**. Petal. **G**. Apical view of flower after anthesis showing tears in calyx cutting into staminal ring. **H**. Two views of stamen and anther with single terminal gland. **I**. Fruiting twig. **J**. Seeds. **K.** Map of distribution in Jamaica. Likely to be found in additional localities and on other islands. (A–C from *Rossato et al. 4855*, ASU0006118; D from photograph of live specimen; E–H from *Folli 4925*, ASU0006103; I from *Baitello 414*, ASU0006091; J from *Carvalho et al. 6859*, ASU0006121). Illustration by Bobbi Angell.

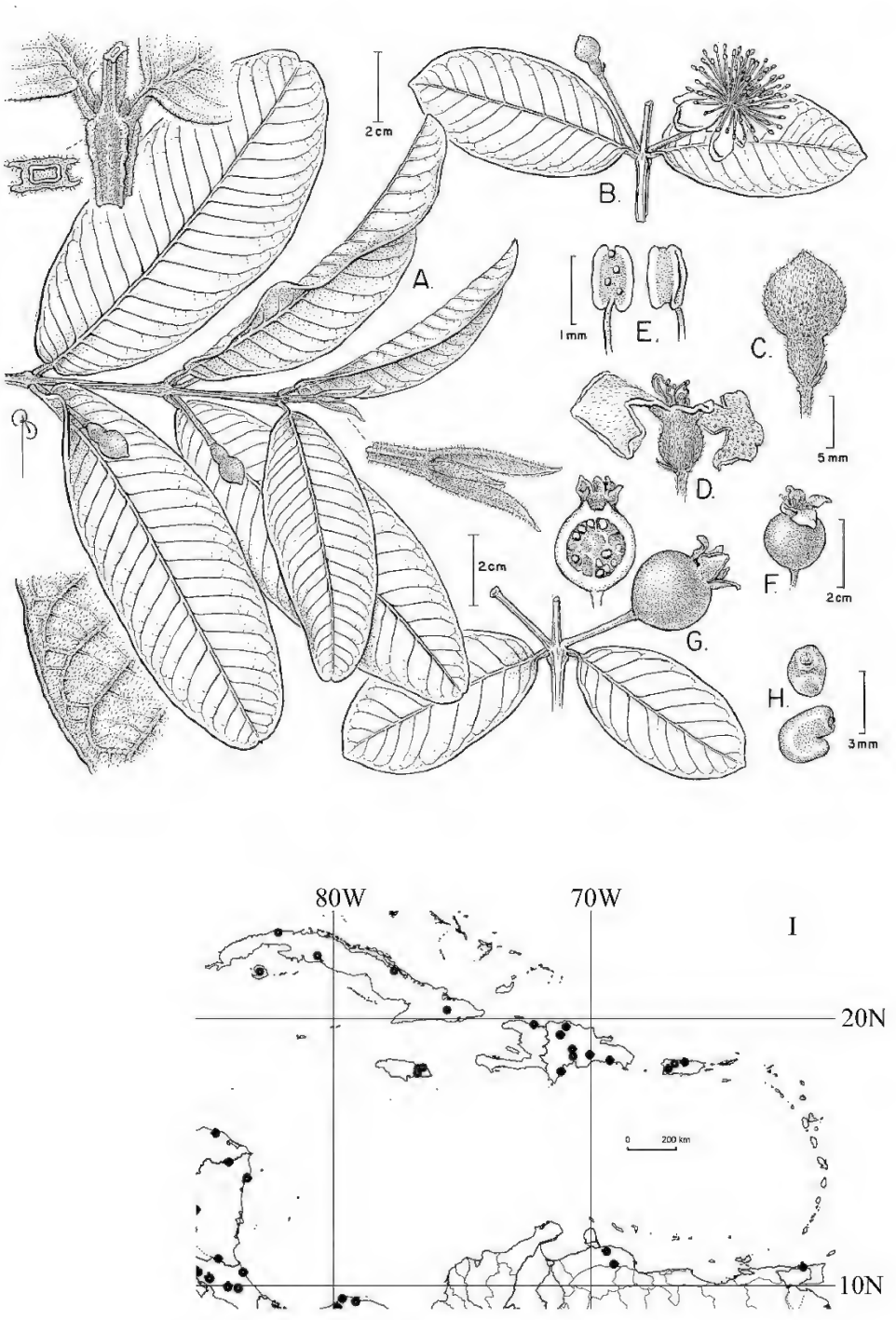


**Figure 7**. *Psidium guajava*: **A**. Branch with flower buds, including close-ups of node showing wings on twigs (upper left) and growing tip with two decussate pairs of immature leaves (right). **B**. Node with open flower and closed bud. **C**. Closed bud with one persistent bracteole. **D**. Flower after anthesis with irregularly torn calyx. **E**. Two views of anther with multiple glands. **F**. Fruit. **G**. Node with fruit attached and longitudinal-section of fruit showing seeds. **H**. Two views of a seed. **I**. Map of distribution in Caribbean region. (A from fresh material from Tempe, Arizona, unknown origin; B, E from *Sanders 8615*, ASU0004830; C, D & F from *Landrum 6301*, ASU0004836; G, H from *Landrum 6343*, ASU0004869). Illustration by Bobbi Angell.

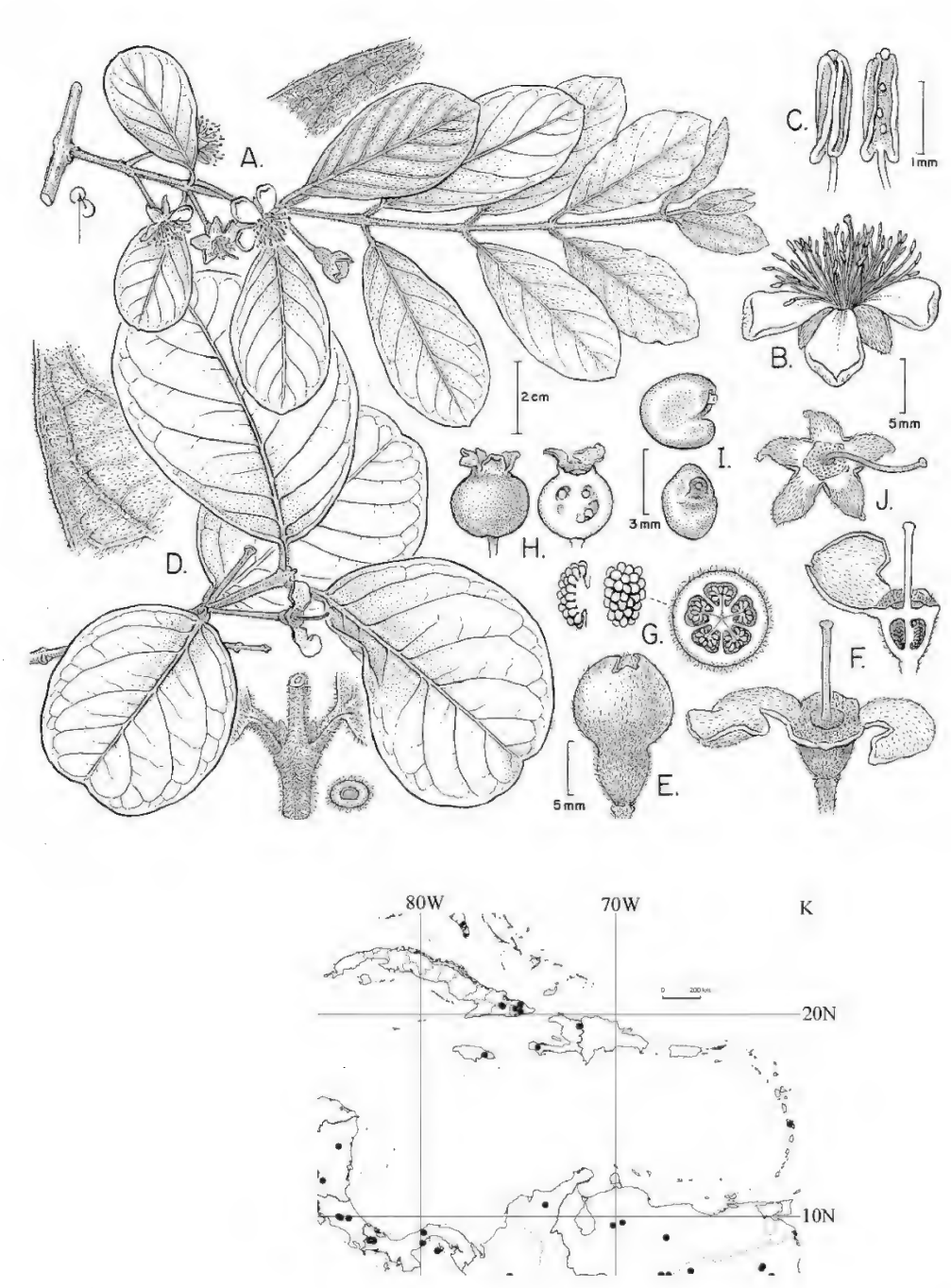


**Figure 8**. *Psidium guineense*: **A**. Branch with flowers and flower bud; detail of lower leaf surface (non-typical form with appressed hairs on lower leaf surface). **B**. Open flower. **C**. Anthers with glands. **D**. Branch with old flower; detail of lower leaf surface (typical form with erect spreading hairs). **E**. Closed bud just beginning to open. **F**. Flowers after anthesis with irregularly opening calyx. **G**. Cross section of ovary showing 5 locules; detail of placentation and ovules. **H**. Fruit and fruit in longitudinal section. **I**. Two views of seed. **J**. Flower after anthesis showing calyx tearing in 5 nearly equal lobes. **K**. Map of distribution in Caribbean region. (A, B from *Landrum 8804*, ASU0008042); C from *Landrum 5676*, ASU0004988; D–I from fresh material grown from seeds from Chiapas, Mexico; J from *Nee 39697*, ASU0007532). Illustration by Bobbi Angell.

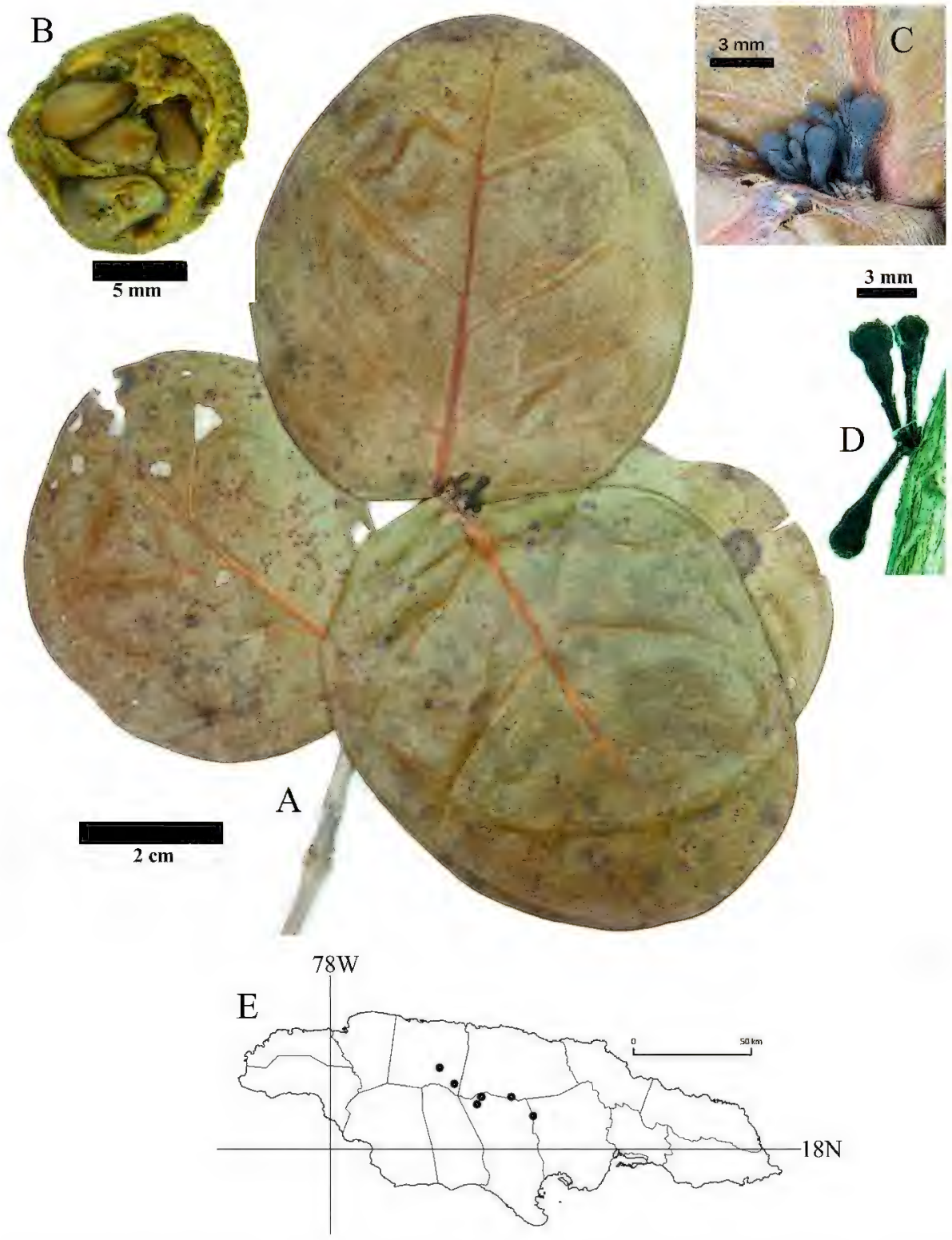


**Figure 9.** *Psidium harrisianum*: **A**. Branch with leaves and flower buds. **B**. Open fruit showing seeds. **C**. flower buds in cluster near shoot apex. **D**. flower buds at leafless node. **E**. Map of distribution. (A & C from *Franck et al. 3796*, USF; B, from *Proctor 37325*, MO; D, from *Proctor 24902*, NY).

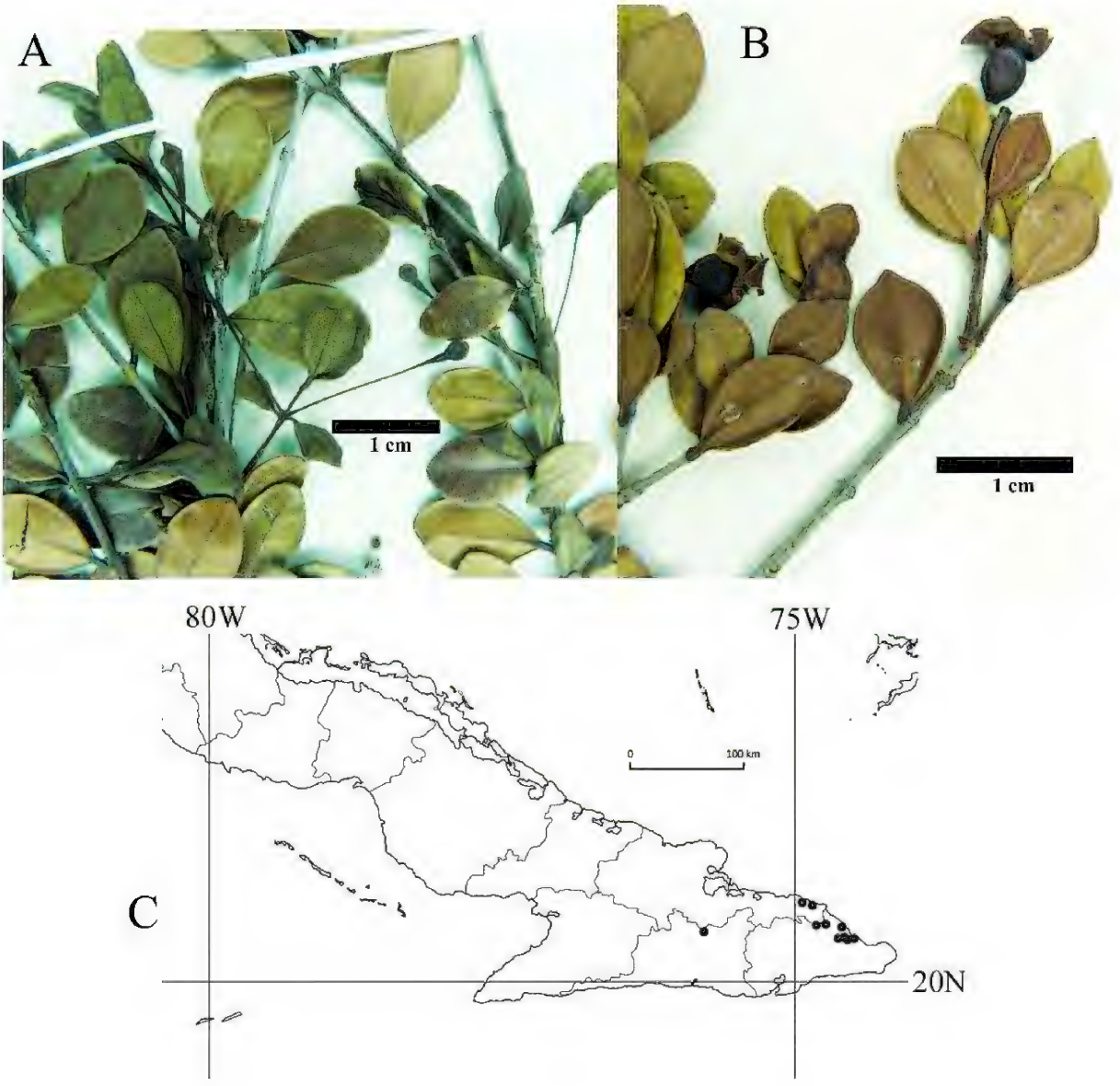


**Figure 10.** *Psidium minutifolium:* **A**. Twigs, leaves, and flower buds. **B**. Twigs, leaves, and young fruits. **C**. Map of distribution. (A from *Álvarez de Zayas et al. 42690*, JE; B from *Wright 2464*, MO).

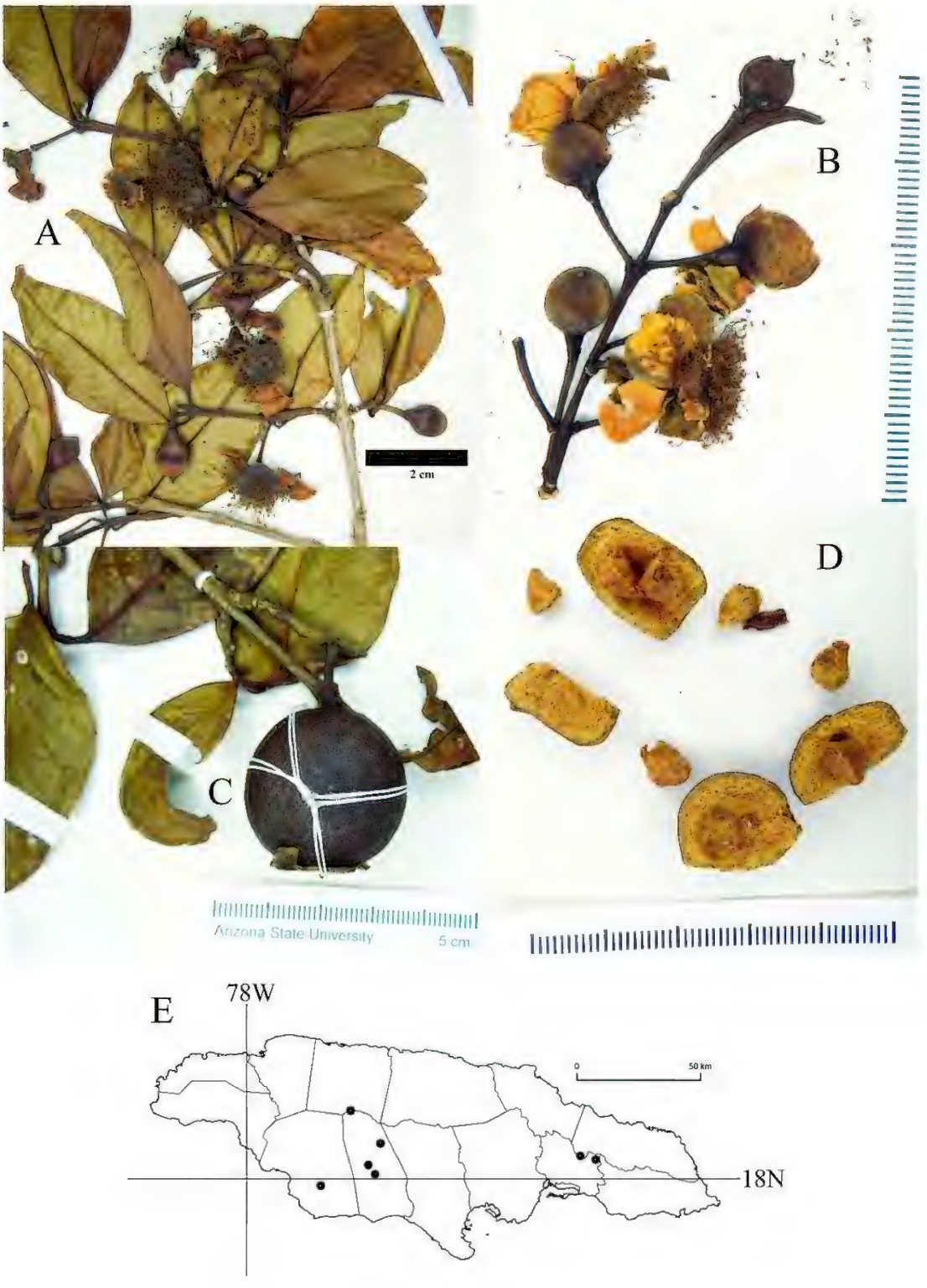


**Figure 11**. *Psidium montanum:* **A**. Twigs, leaves, flowers, flower buds. **B**. Inflorescence with buds and flowers. **C**. Fruit on twig with leaves. **D**. Parts of open fruit and seeds. **E**. Map of distribution. (A, from *Proctor 26438*, MICH; from *Harris 8769*, NY; C from *Proctor 24762*, MICH; D, from *Proctor 24762*, MICH).

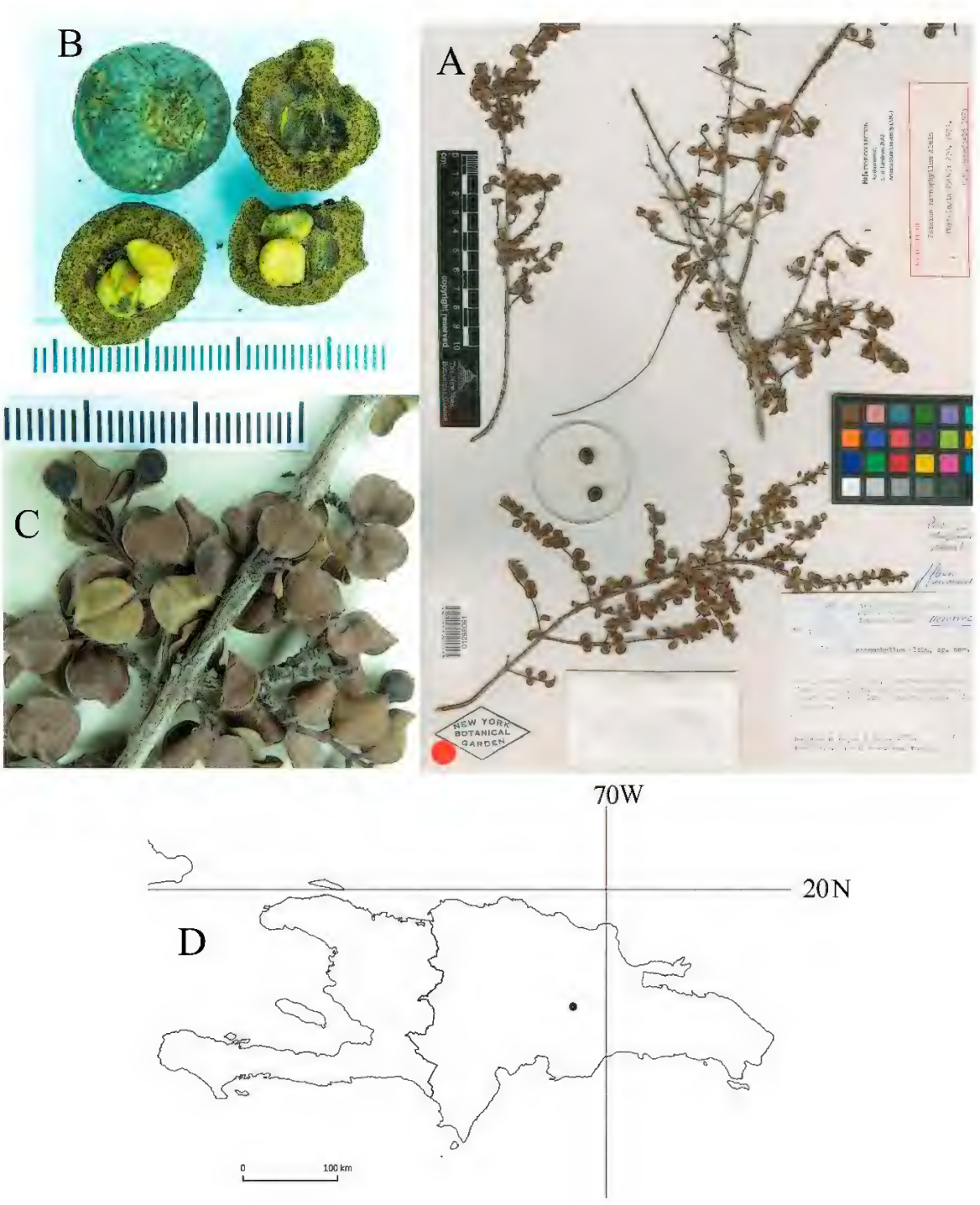


**Figure 12.** *Psidium nannophyllum*: **A**. Holotype sheet, NY. **B**. Closed and open fruit showing seeds. **C**. Close up of twigs, leaves, and flower buds. **D**. Map of distribution. (A, from *Liogier 17378*, Holotype, NY; B, from *Liogier 17378*, US; C, from *Zanoni 12917*, JBSD).

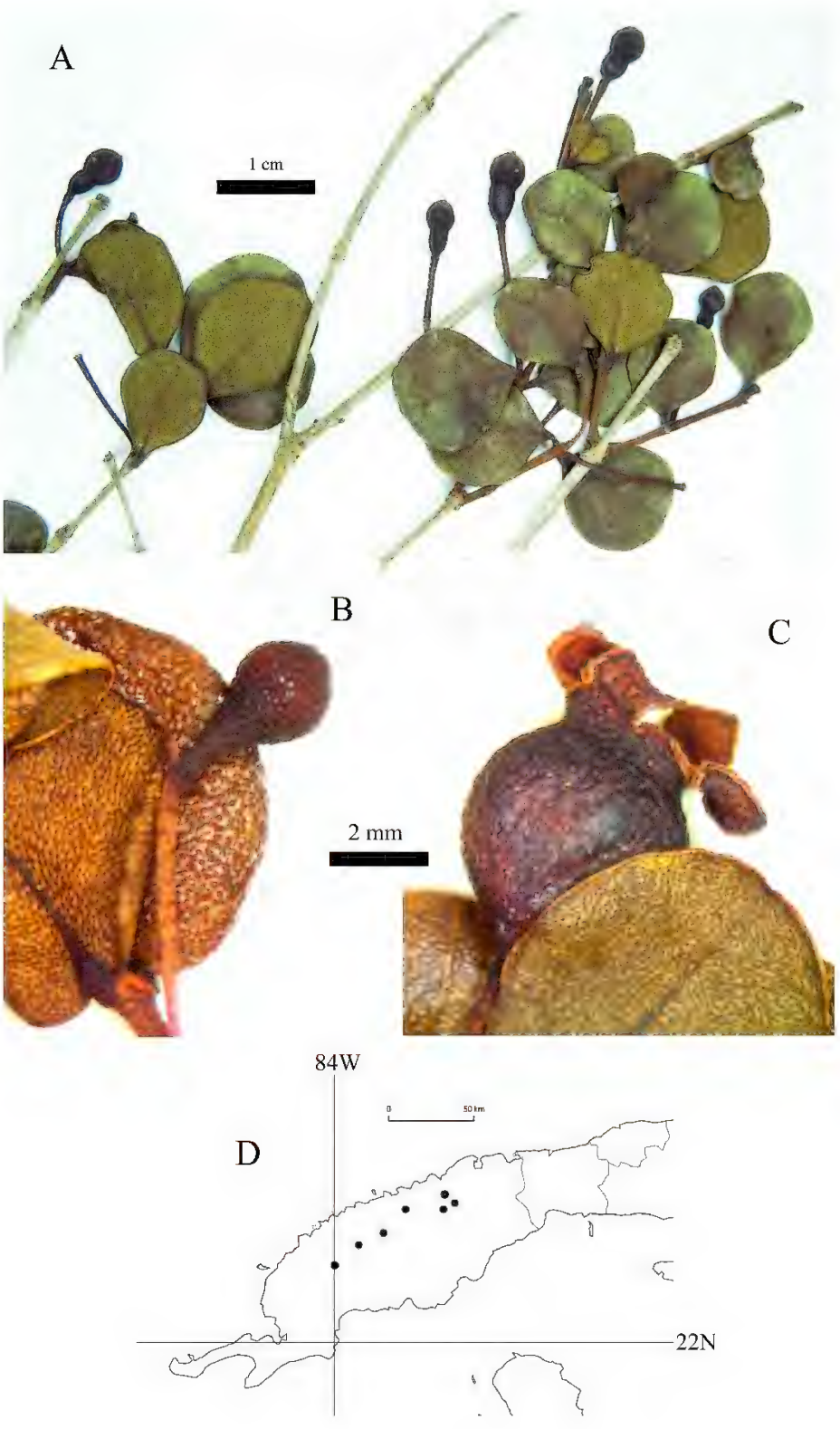


**Figure 13.** *Psidium nummularia*: **A**. Twigs, leaves and unopened flower buds. **B**. Unopened flower bud. **C**. Young fruit. **D**. Map of distribution in western Cuba. (A from *Luis et al 4571*, ASU; B & C from *Luis et al. 4693*, ASU).

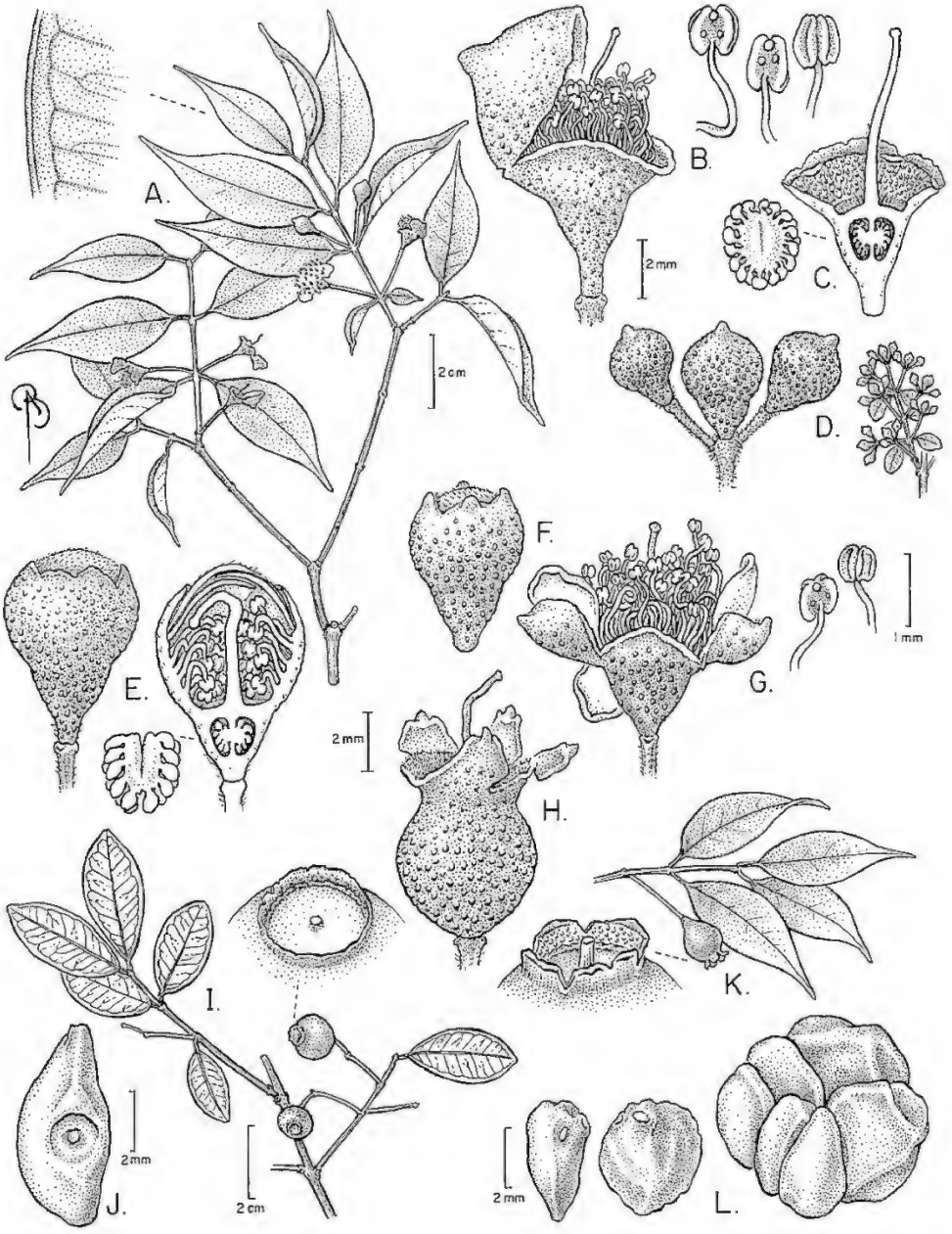


**Figure 14.** *Psidium oligospermum*: **A**. Flowering branch with detail of venation. **B**. Opening flower with calyptra; anthers with terminal gland and two smaller glands below. **C**. Longitudinal section of flower with peltate placenta extracted. **D**. Three-flowered dichasium and cluster of dichasia. **E**. Flower bud, placenta with ovules extracted and longitudinal section of bud. **F**. Flower bud from side; calyx with apical protuberances, these evident in G and H also. **G**. Opening flower from side; two views of an anther, one showing terminal gland and two smaller glands below. **H**. Young fruit from side. **I**. Twig with fruits; apical view of fruit with calyx and staminal ring having fallen. **J**. Seed. **K**. Twig with leaves and fruit; view of fruit apex with calyx having fallen and staminal ring persisting. **L**. Cluster of seeds from a fruit and two individual seeds showing flat and rounded sides. (A–C from *Pirani & Kallunki 2664*, ASU0014404; D from *Nuñez 8602*, ASU0014407; E from *Smith 9729*, ASU0014343; F–G from *Landrum 6524*, ASU0005024; H from *Landrum 6518,* ASU0005010; I–J from *Guillen & Lazo 4340*, ASU0015601; K–L from *Landim* 561, ASU0014337). Illustration by Bobbi Angell.

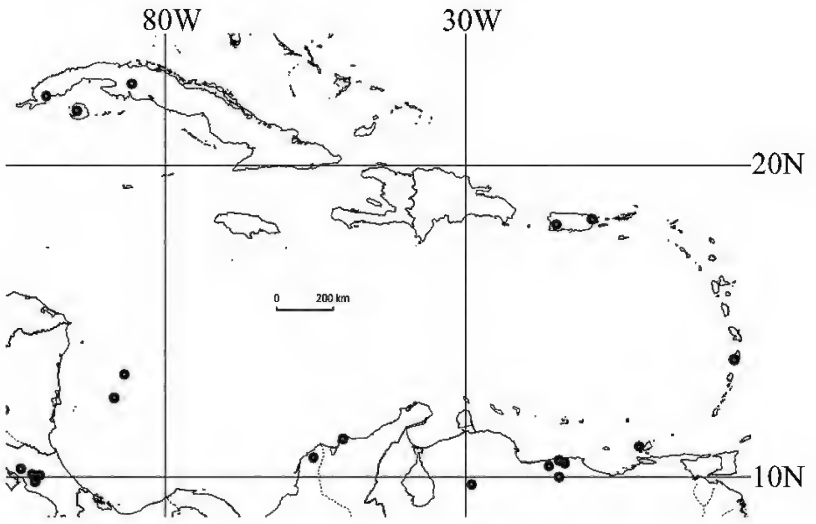


**Figure 15.** Map of distribution of *Psidium oligospermum* in Caribbean region.

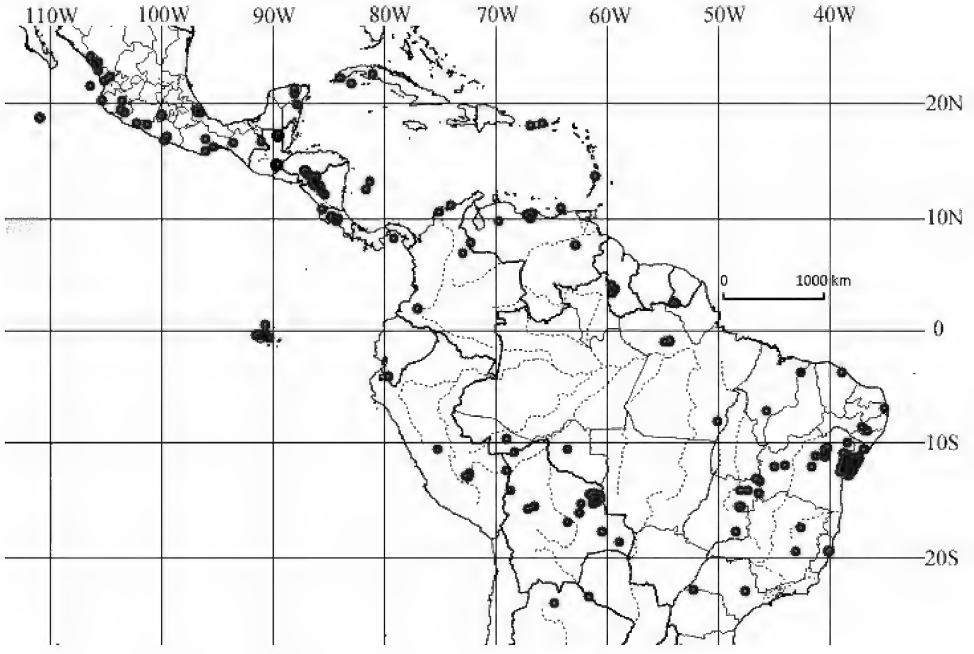


**Figure 16**. Map of distribution of *Psidium oligospermum* throughout its natural range. This species is one of the most widespread of the genus and is a good example of the natural range of *Psidium*. Scale bar is most accurate near the equator.

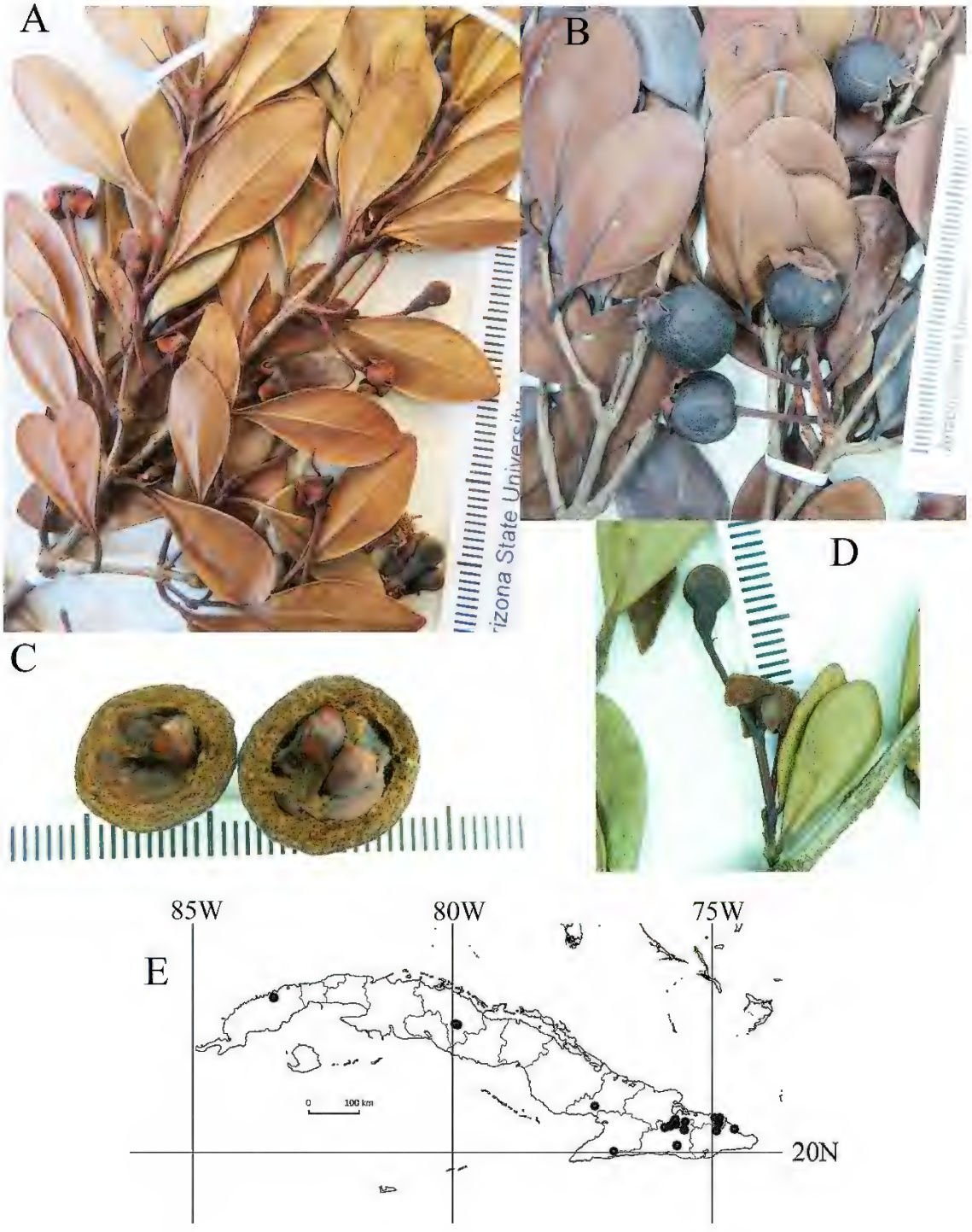


**Figure 17.** *Psidium parvifolium*: **A**. Twigs with leaves, leaves, buds, and flowers past anthesis. **B**. Twigs with leaves and fruits. **C**. Open fruit showing seeds. **D**. Part of a 3-flowered dichasial inflorescence, the central flower passed anthesis, the left flower in bud. **E**. Map of distribution. (A from *Bisse 44046*, JE; B from *Bisse & Lippold 18109*, JE; C from *Alain & Clemente 978*, US; D from *Acuña 12614*, US).

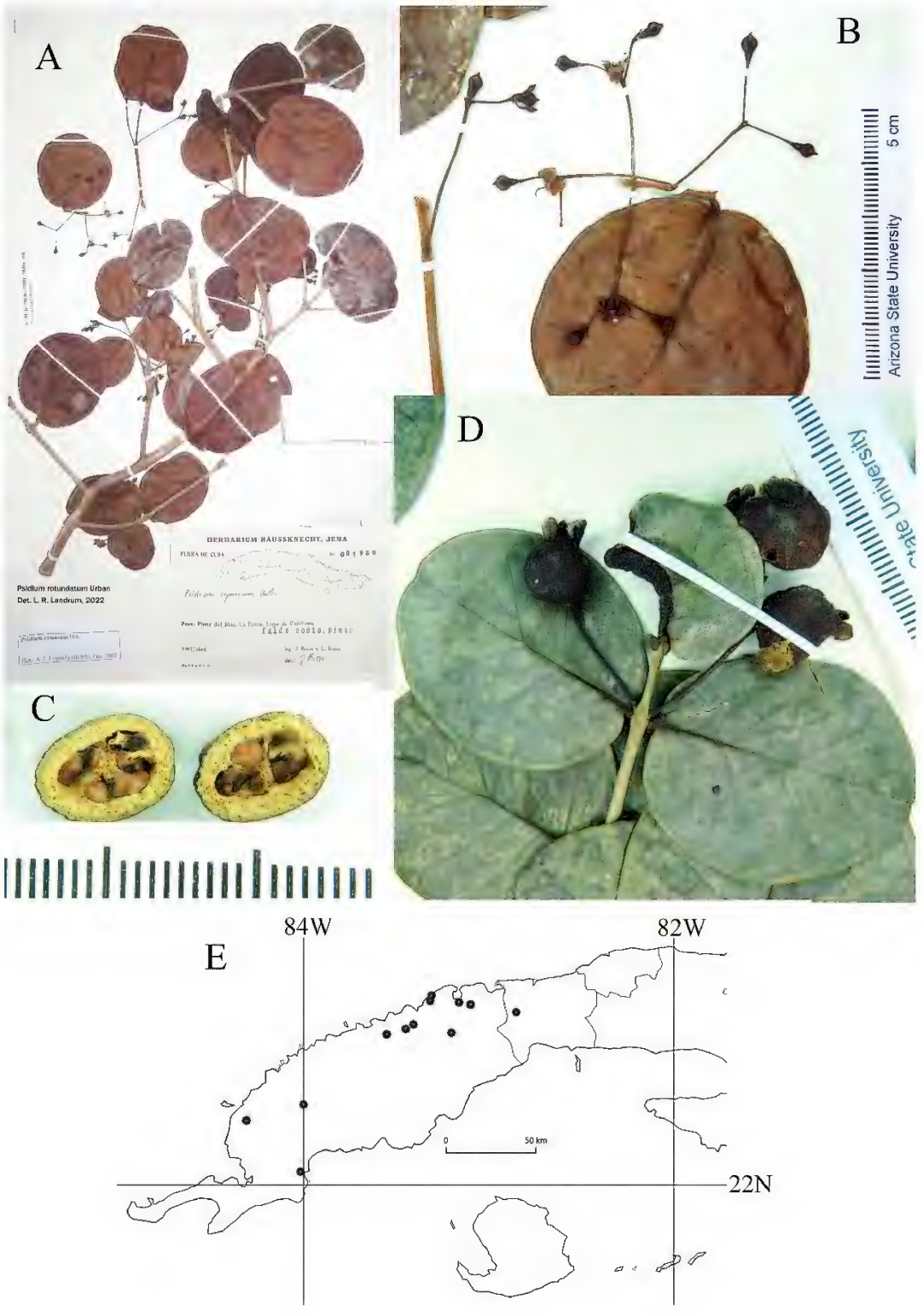


**Figure 18.** *P. rotundatum*: **A**. Herbarium sheet. **B**. Dichasial inflorescences. **C**. Open fruit with seeds. **D**. Twig, leaves, and fruits. **E**. Map of distribution in western Cuba. (A & B from *Bisse 1980*, JE; C from *Ekman 17395*, NY; D from *Bisse & Rojas 4578*, JE).

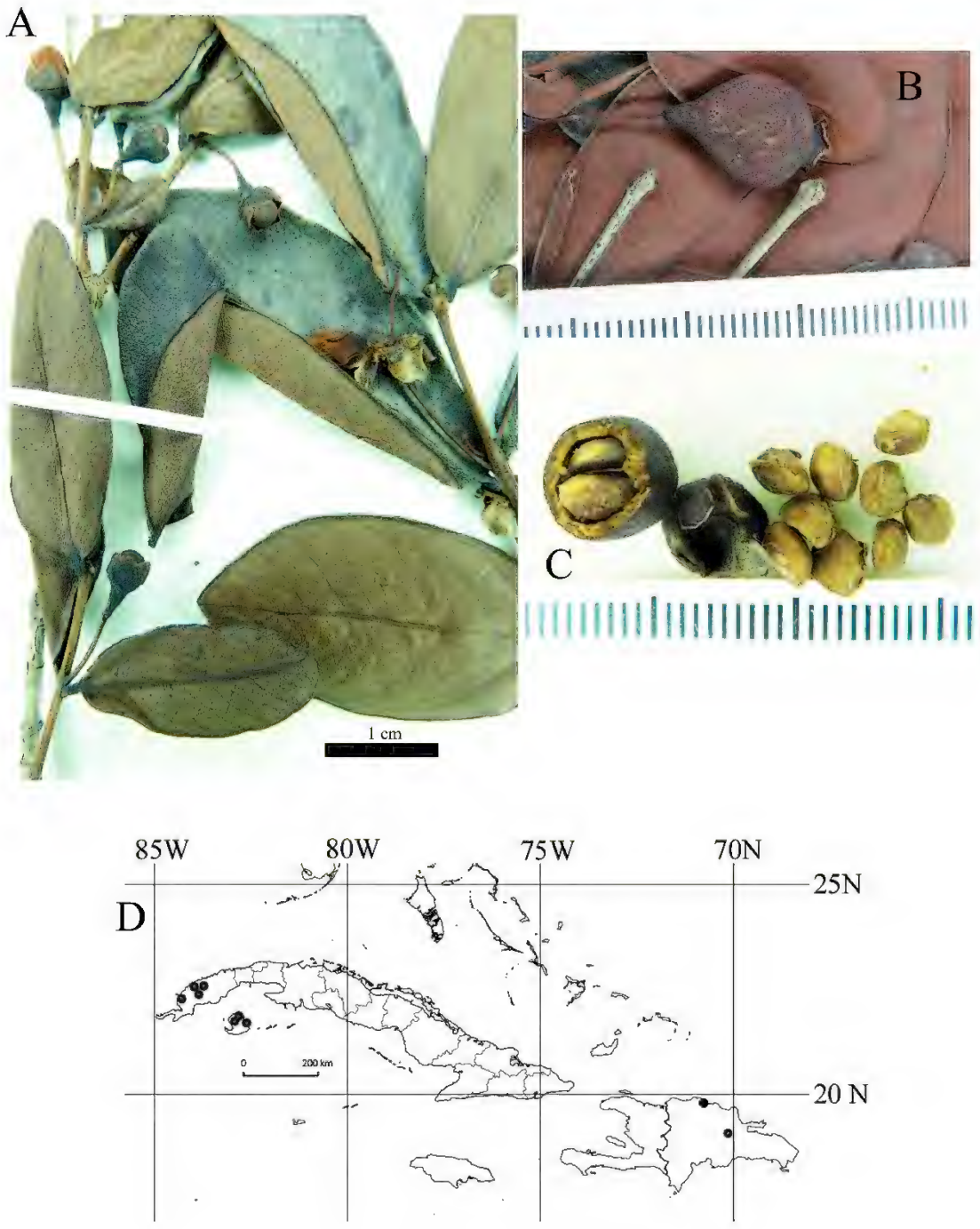


**Figure 19.** *Psidium salutare*: **A**. Twigs, leaves, flower buds, and flowers past anthesis. **B**. Closed fruit. **C**. Open fruit and seeds. **D**. Map of distribution in Greater Antilles. (A from *Bisse 31123*, JE; B from *Bisse & Rojas 4454*, JE; C from *Bisse 9518*, JE).

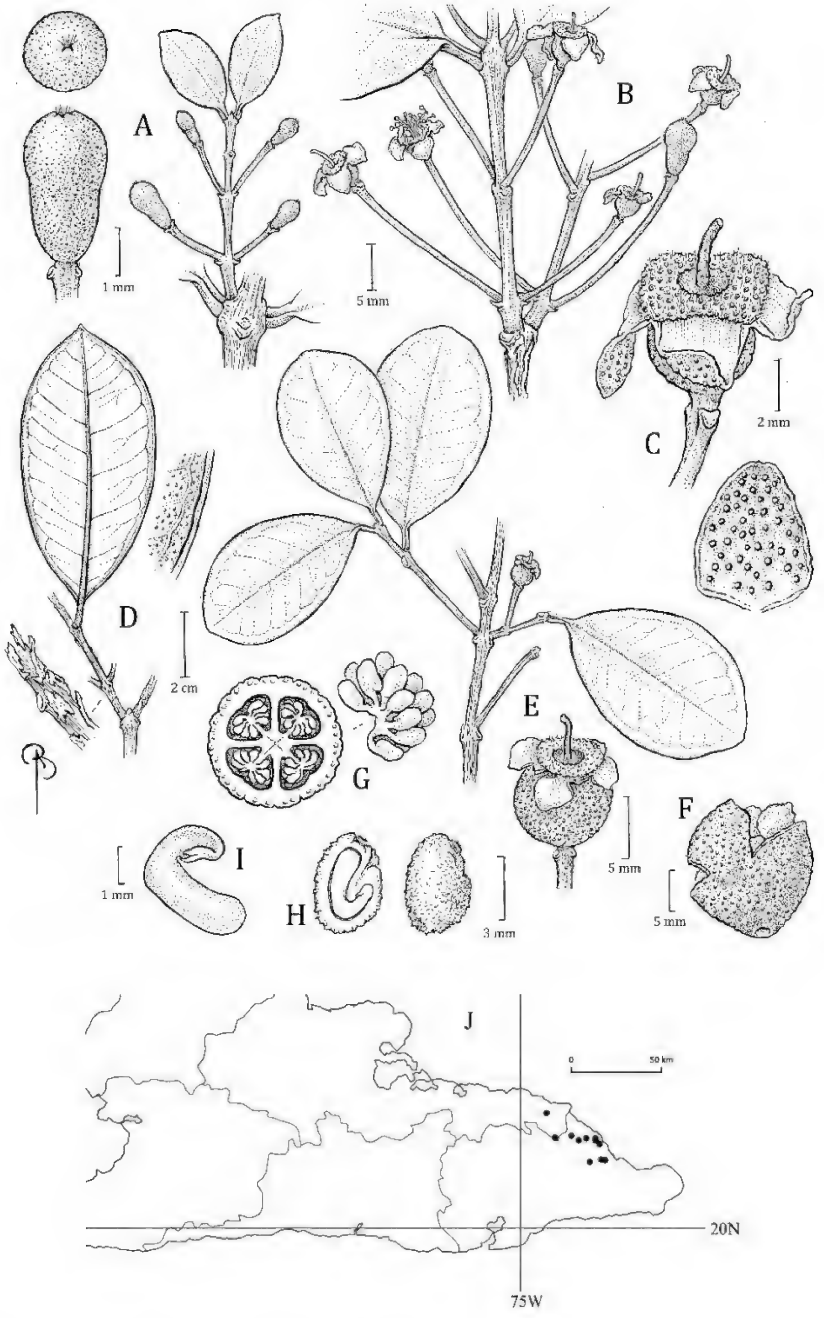


**Figure 20.** *Psidium urquiolanum*: **A**. Closed flower bud from side and above, showing apical pore in closed calyx with small hairs protruding; young leafy shoot with flower buds at first two nodes. **B**. Two older shoots with one closed bud and flowers at first two nodes. **C**. Flower after anthesis, with enlarged calyx remnant showing external glandular surface. **D**. Twig and leaf, with enlarged part of margin and twig; venation more evident than usual. **E**. Developing fruit on branchlet with leaves attached. **F**. flattened mature fruit, with seeds emerging. **G**. Cross section of ovary showing 4 locules with peltate placentas with ovules; one placenta extracted with ovules. **H**. Seed in section showing C-shaped inner cavity with embryo in place. **I**. Extracted embryo with reflexed cotyledons. **J**. Map of distribution in eastern Cuba. (A, B, C, & G from *Bisse 21450*, JE; D& E from *Urquiola 7108*, ASU; F from *Álvarez et al. 27137*, JE; H, I from *Bisse 6818*, JE). Illustration by Bobbi Angell.

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**LIST OF SPECIMENS EXAMINED**

Holotypes, isotypes and syntypes are in bold. Each collection is followed by the accepted name. A collection in bold may be the type of an accepted name or one of its synonyms.

**Abbott 1247** P. acranthum
Abdo & Campbell, K. 2610 P. harrisianum
Abdo & Campbell, K. 2614 P. harrisianum
Acuna & Alain 17274 P. rotundatum
Acuna 12613 P. parvifolium
Acuna 12614 P. parvifolium
Acuna 12618 P. parvifolium
Acuna 13261 P. minutifolium
Adams 11677 P. cattleianum
Alain 498 P. rotundatum
Alain 625 P. rotundatum
Alain 1194 P. rotundatum
Alain 2575 P. rotundatum
Alain 3021 P. rotundatum
Alain 3610 P. parvifolium
Alain 3656 P. parvifolium
Alain 3843 P. parvifolium
Alain 4232 P. rotundatum
Alain 6101 P. rotundatum
Alain 6143 P. rotundatum
**Alain 6782** P. nummularia
Alain & Acuna 1392 P. rotundatum
Alain & Clemente 948 P. parvifolium
Alain & Clemente 1448 P. rotundatum
Alain & Clemente 1486 P. rotundatum
Alain & Lopez Figueiras 4631 P. parvifolium
Alain & Lopez Figueiras 4633 P. parvifolium
**Alain et al. 7568** P. minutifolium
Álvarez de Zayas et al. 42690 P. minutifolium
Álvarez et al. 27136 P. urquiolanum
Álvarez et al. 27137 P. urquiolanum
Álvarez et al. 32614 P. rotundatum
Álvarez et al. 33784 P. urquiolanum
Álvarez et al. 35676 P. parvifolium
Álvarez et al. 35937 P. guajava
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Areces et al. 40095 P. urquiolanum
Arias 53739 P. cf. rotundatum
Arias et al. 49144 P. parvifolium
Arias et al. 49256 P. parvifolium
Arias et al. 49321 P. guineense
Arias et al. 50001 P. guineense
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Arias et al. 53224 P. parvifolium
Arias et al. 53366 P. parvifolium
Bassler et al. 47827 P. parvifolium
Bassler et al. 48235 P. rotundatum
Berazaín et al. 43459 P. rotundatum
Bisse 284 P. guajava
Bisse 765 P. salutare
Bisse 919 P. guajava
Bisse 6818 P. urquiolanum
Bisse 9518 P. salutare
Bisse 15740 P. parvifolium
Bisse 15772 P. parvifolium
Bisse 15854 P. parvifolium
Bisse 15911 P. parvifolium
Bisse 16722 P. parvifolium
Bisse 16753 P. parvifolium
Bisse 16764 P. parvifolium
Bisse 16967 P. urquiolanum
Bisse 16987 P. parvifolium
Bisse 17073 P. urquiolanum
Bisse 17082 P. parvifolium
Bisse 17121 P. minutifolium
Bisse 20212 P. parvifolium
Bisse 20247 P. parvifolium
**Bisse 21450** P. urquiolanum
Bisse 23405 P. rotundatum
Bisse 27000 P. urquiolanum
Bisse 31027 P. rotundatum
Bisse 44882 P. parvifolium
Bisse & Berasain 21979 P. parvifolium
Bisse & Berasain 22249 P. guineense
Bisse & Berazaiu 22208 P. parvifolium
Bisse & Berazaiu 22627 P. parvifolium
Bisse & Kohler 5291 P. urquiolanum
Bisse & Kohler 5492 P. minutifolium
Bisse & Kohler 5618 P. parvifolium
Bisse & Kohler 6158 P. minutifolium
Bisse & Kohler 6661 P. parvifolium
Bisse & Kohler 6774 P. urquiolanum
Bisse & Kohler 6909 P. parvifolium
Bisse & Kohler 7219 P. parvifolium
Bisse & Kohler 7314 P. parvifolium
Bisse & Kohler 7387 P. parvifolium
Bisse & Kohler 7394 P. parvifolium
Bisse & Kohler 7459 P. parvifolium
Bisse & Kohler 7474 P. parvifolium
Bisse & Kohler 7475 P. parvifolium
Bisse & Kohler 7609 P. parvifolium
Bisse & Kohler 7928 P. guineense
Bisse & Kohler 7987 P. parvifolium
Bisse & Kohler 8754 P. parvifolium
Bisse & Kohler 8761 P. parvifolium
Bisse & Kohler 9298 P. parvifolium
Bisse & Lippold 10465 P. cf. parvifolium
Bisse & Lippold 11345 P. minutifolium
Bisse & Lippold 11590 P. minutifolium

Bisse & Lippold 11596 P. minutifolium
Bisse & Lippold 11817 P. parvifolium
Bisse & Lippold 11888 P. urquiolanum
Bisse & Lippold 12000 P. parvifolium
Bisse & Lippold 17691 P. parvifolium
Bisse & Lippold 17982 P. parvifolium
Bisse & Lippold 18038 P. parvifolium
Bisse & Lippold 18072 P. parvifolium
Bisse & Lippold 18109 P. parvifolium
Bisse & Lippold 18283 P. rotundatum
Bisse & Lippold 18677 P. rotundatum
Bisse & Rojas 1980 P. rotundatum
Bisse & Rojas 2746 P. parvifolium
Bisse & Rojas 3016 P. guajava
Bisse & Rojas 3186 P. parvifolium
Bisse & Rojas 3527 P. parvifolium
Bisse & Rojas 3528 P. parvifoliumXminutifolium?
Bisse & Rojas 3957 P. parvifoliumXminutifolium?
Bisse & Rojas 4028 P. parvifolium
Bisse & Rojas 4162 P. parvifolium
Bisse & Rojas 4176 P. parvifolium
Bisse & Rojas 4247 P. parvifolium
Bisse & Rojas 4289 P. parvifolium
Bisse & Rojas 4454 P. salutare
Bisse & Rojas 4470 P. parviflorum
Bisse & Rojas 4578 P. rotundatum
Bisse & Rojas 4923 P. rotundatum
Bisse et al. 26901 P. minutifolium
Bisse et al. 31123 P. salutare
Bisse et al. 39439 P. parvifolium
Bisse et al. 39927 P. minutifolium
Bisse et al. 39950 P. minutifolium
Bisse et al. 40109 P. minutifolium
Bisse et al. 41418 P. salutare
Bisse et al. 41520 P. oligospermum
Bisse et al. 44046 P. parvifolium
Bisse et al. 44059 P. parvifolium
Bisse et al. 44537 P. parvifolium
Bisse et al. 44808 P. parvifolium
Bisse et al. 46641 P. salutare
Bisse et al. 48988 P. rotundatum
Britton 1096 P. montanum
Britton 7309 P. salutare var. salutare
Britton 10093 P. salutare var. salutare
Britton 15160 P. salutare var. salutare
Britton & Britton 7548 P. salutare var. salutare
Britton & Hess 2824 P. oligospermum
Britton et al. 6450 P. salutare var. salutare
Britton et al. 14401 P. salutare var. salutare
Britton & Britton 7220 P. oligospermum
Carabia 3749 P. parvifolium
Carabia 3750 P. parvifolium
Chandler 30 P. guajava
Chrysagone 5154 P. parvifolium
Clase, T. 6915 P. acranthum
Clase et al. 1179 P. amplexicaule
Clement 1848 P. guajava
Clemente 4330 P. parvifolium
Cubalo 6104 P. rotundatum
Cubalo 6240 P. rotundatum
Curtiss 350 P. salutare var. salutare
Duke 7325 P. guajava
Duke 7389 P. guajava
Duke 7641 P. guajava
Duke 7349 P. oligospermum
Ekman 2041 P. guineense
**Ekman 2505** P. parvifolium
**Ekman H 4098** P. amplexicaule
Ekman H 4112 P. amplexicaule
Ekman 4405 P. minutifolium
Ekman 4513 P. parvifolium
Ekman H 4578 P. amplexicaule
**Ekman H 4963** P. acranthum
**Ekman 5612** P. parvifolium
**Ekman H 7308** P. acranthum
**Ekman H 8521** P. acranthum
**Ekman 9296** P. parvifolium
Ekman 9999 P. parvifolium
Ekman 9776 P. guineense
Ekman 9931 P. guineense
Ekman 9932 P. guineense
Ekman 10766 P. guineense
Ekman 13772 P. rotundatum
Ekman 14558 P. amplexicaule
Ekman 14658 P. acranthum
Ekman 14858 P. acranthum
Ekman 14909 P. parvifolium
Ekman 15097 P. acranthum
Ekman 16395 P. rotundatum
Ekman 16395 P. rotundatum
Ekman 16419 P. guajava
**Ekman 16564** P. nummularia
Ekman 16787 P. salutare var. salutare
Ekman 16957 P. oligospermum
Ekman 17295 P. rotundatum
**Ekman 17342** P. rotundatum
Ekman 17395 P. rotundatum
**Ekman 17980** P. nummularia
**Ekman 18025** P. nummularia
**Ekman 18219** P. nummularia
**Ekman 18471** P. nummularia
Ekman 18861 P. parvifolium
**Ekman 18887** P. oligospermum
Figueiras, 230 P. parvifolium
Flickinger et al. 03 P. harrisianum
Flickinger et al. 09 P. harrisianum
Flickinger et al. 25 P. parvifolium
Flickinger et al. 35 P. parvifolium
Flickinger et al. 43 P. parvifolium
Flickinger et al. 45 P. parvifolium
Flickinger et al. 47 P. parvifolium
Flickinger et al. 50 P. parvifolium
Flickinger et al. 64 P. rotundatum
Franck 3796 P. harrisianum
Franck 3842 P. harrisianum
Franck et al. 3796 P. harrisianum
García et al. 4447 P. acranthum
García et al. 2711 P. amplexicaule
Gentry & Zanoni 50637 P. amplexicaule
Grifo & Matuszak 204 P. acranthum
Grifo & Matuszak 218 P. acranthum
Grifo & Matuszak 86 P. oligospermum
Harris 5156 P. montanum
Harris 5333 P. montanum
Harris 5408 P. montanum
Harris 8769 P. montanum
Harris 9406 P. montanum
**Harris 9583** P. albescens
Harris 9998 P. albescens
Harris 10016 P. montanum
**Harris 11000** P. harrisianum
Harris 12036 P. montanum
Hartley 13378 P. guajava
Holdridge 7 P. amplexicaule
**Holdridge 1958** P. acranthum
Howard 94 P. parvifolium
Howard 13861 P. guajava
Howard & Proctor 13680 P. montanum
Howard & Proctor 14373 P. harrisianum
Howard et al. 288 P. oligospermum

Jennings 29 P. salutare var. salutare
Jennings 217 P. salutare var. salutare
Jimenez 2433 P. salutare var. salutare
Jimenez 4930 P. guajava
Jones 99 P. amplexicaule
Jones & Zanoni 132 P. guajava
Killip 13563 P. salutare var. salutare
Leon 11948 P. parvifolium
**Leon 12028** P. parvifolium
Leon 12532 P. rotundatum
Leon 12547 P. rotundatum
Leon 12603 P. rotundatum
Leon 12653 P. rotundatum
Leon 12692 P. rotundatum
Leon 13543 P. rotundatum
Leon 13806 P. rotundatum
Leon 13810 P. rotundatum
Leon 13836 P. rotundatum
Leon 13863 P. rotundatum
Leon 14336 P. salutare var. salutare
Leon 16822 P. rotundatum
Leon & Charles 4941 P. rotundatum
Leon & Clemente 23020 P. parvifolium
Leon & Clemente 23164 P. minutifolium
Leon & Clemente 23264 P. parvifolium
Leon & Clemente 23276 P. parvifolium
Leon & Clemente 23291 P. parvifolium
Leon & Roig 13543 P. rotundatum
Leon & Roig 15973 P. rotundatum
Leon & Victorin 18893 P. salutare var. salutare
Leon, Clemente, & Roca 10211 P. parvifolium
Leon, Clemente, Alain 22477 P. parvifolium
Leon, Clemente, Howard 20110 P. parvifolium
Leon, Victorin, & Clemente 20689 P. parvifolium
Leonard 12354 P. amplexicaule
Lewis 903 P. harrisianum
Liogier 15877 P. amplexicaule
Liogier 16145 P. amplexicaule
Liogier 16473 P. amplexicaule
**Liogier 16557** P. amplexicaule
Liogier 17378 P. nannophyllum
**Liogier 17378** P. nannophyllum
Liogier 17385 P. amplexicaule
Liogier 17895 P. amplexicaule
Liogier 18880 P. acranthum
Liogier 18963 P. acranthum
Liogier 18974 P. acranthum
Liogier 19342 P. amplexicaule
Liogier 19785 P. acranthum
Liogier 20001 P. amplexicaule
**Liogier 20940** P. acranthum
Liogier 21278 P. amplexicaule
**Liogier 21467** P. amplexicaule
Liogier 24466 P. amplexicaule
Liogier 24517 P. amplexicaule
Liogier 26323 P. acranthum
Liogier 26358 P. amplexicaule
Liogier 26657 P. salutare
Liogier 30729 P. oligospermum
Liogier 32103 P. amplexicaule
Liogier 35533 P. oligospermum
Liogier 35533 P. oligospermum
Lippold 17358 P. salutare
Little 21705 P. oligospermum
Little 21705 P. sintenisii
Little 25729 P. sintenisii
Lopez 2825 P. parvifolium
Lopez 2578 P. parvifolium
Luis 4693 P. nummularium
Marie-Victorin & Clemente 21810 P. parvifolium
Mejia & Zanoni 8574 P. guajava
Mejia, Pimentel & Garcia 1430 P. amplexicaule
Mexia & Zanoni 7668 P. guajava
Mejia & Zanoni 7878 P. amplexicaule
Mejia & Zanoni 7917 P. guajava
Mejia & Zanoni 8368 P. guajava
Miller 1309 P. montanum
Morton 9822 P. rotundatum
Morton & Acuna 2965 P. parvifolium
Otero 243 P. guajava
Palmer & Riley 212 P. salutare var. salutare
Palmer & Riley 931 P. salutare var. salutare
Parker 2847 P. guajava
Peguero et al. 1366 P. amplexicaule
Peguero et al. 1370 P. amplexicaule
Proctor 9744 P. harrisianum
Proctor 11396 P. harrisianum
Proctor 19650 P. amplexicaule
**Proctor 19650** P. amplexicaule
Proctor 19707 P. cattleianum
Proctor 19727 P. albescens
Proctor 20669 P. guineense
Proctor 22738 P. harrisianum
Proctor 23127 P. montanum
Proctor 24762 P. montanum
Proctor 24902 P. harrisianum
Proctor 25580 P. cattleyanum
Proctor 26438 P. montanum
Proctor 26442 P. cattleianum
Proctor 26507 P. harrisianum
Proctor 26691 P. harrisianum
Proctor 27645 P. montanum
Proctor 28876 P. montanum
Proctor 29291 P. guajava
Proctor 32738 P. montanum
Proctor 34373 P. harrisianum
Proctor 37088 P. montanum
Proctor 37325 P. harrisianum
Proctor 37347 P. montanum
Pruski 1554 P. guajava
Roig 41 P. parvifolium
Roig 1054 P. salutare var. salutare
Roig 1547 P. parvifolium
Roig & Cremata P. oligospermum
Rugel 264 P. guajava
Rugel 353 P. guajava
Rugel 353 P. guajava
Rugel 648 P. guajava
Salywon 1276 P. oligospermum
Salywon et al. 808 P. guajava
Salywon et al.1276 P. sintenisii
Salywon et al. 1281 P. guajava
Salywon et al. 1210 P. amplexicaule
Salywon et al. 1322 P. amplexicaule
Salywon et al. 1348 P. amplexicaule
Shafer 8623 P. guineense
Shafer 10922 P. salutare var. salutare
Shafer & Br. Leon 13570 P. salutare var. salutare
Shafer & Br. Leon 13680 P. salutare var. salutare
Shafer & Leon 13672 P. salutare var. salutare
Shafer, J. A. 3878 P. parvifolium
Sintenis 272 P. guajava
Sintenis 1347 P. oligospermum
Skean, 1314 P. guajava
Skean 1559 P. guajava
Skog 1518 P. guajava
**Sintenis 1347** P. oligospermum
Solomon 5725 P. guajava
Stenzel & Polo Márquez 1318 P. rotundatum
Stenzel & Polo Márquez 1319 P. rotundatum

Urquiola et al. 7498 P. oligospermum
Urquiola et al. 6887 P. oligospermum
Urquiola 270 P. salutare
Urquiola 381 P. rotundatum
Urquiola 528 P. oligospermum
Urquiola 685 P. guineense
Urquiola 1133 P. rotundatum
Urquiola 1134 P. rotundatum
Urquiola et al. 749-B P. oligospermum
Urquiola et al. 4522 P. salutare var. salutare
Urquiola et al. 6678 P. salutare var. salutare
Urquiola et al. 6887 P. oligospermum
Urquiola et al. 7498 P. oligospermum
Urquiola et al. 7934 P. rotundatum
Urquiola et al. 9180 P. parvifolium
Urquiola et al. 7798 P. rotundatum
Urquiola et al. 7108 P. urquiolanum
Valeur 626 P. guajava
Vasconcelos 578 P. acranthum
Veloz 814 P. amplexicaule
Veloz 4211 P. nannophyllum
Veloz & Peguero 480 P. amplexicaule
Webster et al. 8158 P. cattleianum
Webster 3827 P. parvifolium
Webster & Proctor 5420 P. harrisianum
**Woodbury 20506** P. oligospermum
**Wright 743** See Wright 3556
**Wright 2436** P. salutare var. salutare
**Wright 2436a** P. salutare var. salutare
**Wright 2438** P. parvifolium
**Wright 2456** P. rotundatum
**Wright 2457** P. rotundatum
**Wright 2458** P. nummularia
**Wright 2463** P. parvifolium
**Wright 2464** P. minutifolium
Wright 2466 P. guajava
**Wright 3556** P. parvifolium
**Wright 3557** P. oligospermum
Zanagoritia 5303 P. salutare var. salutare
Zanoni 12917 P. nannophyllum
Zanoni 22998 P. amplexicaule
Zanoni 24734 P. acranthum
Zanoni 33920 P. acranthum
Zanoni 34385 P. acranthum
Zanoni & Jones 43105 P. amplexicaule
Zanoni et al. 30134 P. guajava
Zanoni et al. 33501 P. amplexicaule
Zanoni et al. 32897 P. guajava
Zanoni et al. 34385 P. acranthum
Zanoni et al. 35199 P. amplexicaule
Zarragatia 5303 P. salutare var. salutare

# POTAMOGETONACEAE PONDWEED FAMILY

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Aquatic submerged and floating perennials, rarely annual herbs, caulescent, rhizomatous or not, the stems terete or flattened; turions (vegetative propagules) present or absent. LEAVES alternate or rarely opposite, submerged or submerged and floating, rarely erect, sessile or petiolate; sheathing stipules free or adnate to the petioles. INFLORESCENCES terminal or axillary, spikes or panicles of spikes, pedunculate, the peduncle not elongating or spiraling after fertilization [as in Ruppiaceae]. FLOWERS bisexual, sessile; floral bracts absent; tepals 4 in 1 series, free, claw-like, the apex rounded; stamens (2–)4, in 1 series, epipetalous; anthers sessile, distinct, 2-loculed; pollen spherical; pistils (1–)4, sessile, distinct, rarely short stipulate, 1-locular; ovule 1; style sessile or short, erect or curved, persistent. FRUITS drupaceous, sessile, 1-seeded, indehiscent, embryo curved. —3 genera, ca. 90 spp.; nearly worldwide. Reveal, J. 1977. Intermountain Flora 6: 24–42; Haynes, R. R. and C. B. Hellquist. 2000. Flora of North America. 22: 47–74.

Many of the species of both *Potamogeton* and *Stuckenia* are known to be highly polymorphic and difficult to distinguish. The known species in Arizona are among the most common and polymorphic of these genera. Under ideal conditions, these species can easily be identified and the keys provided are meant to aid in identifying our material under these conditions. Sterile and less-than-ideal collections can be extremely difficult to determine and are often left to individual interpretation. Aquatic habitats provide their own unique issues, both in the physical collection and the quality of material needed for identification. Under the best conditions, early in the season, the plant material may be green and healthy and show all the characteristics described below. However, as the season wears on, such things as grazing, water level, and desiccation significantly affect the quality of the plants. The combination of collecting representative vegetative material and mature fruits, especially in broad leafy species, can be challenging. At higher elevations, fruits generally mature mid-to-late summer or early fall, often after vegetative material has weathered.

The similar and closely allied families Ruppiaceae (Ricketson 2018a) and Zannichelliaceae (Ricketson 2018b) should be consulted when identifying aquatic plants of Arizona.

Species of Potamogetonaceae are known to hybridize freely, and hybrids are generally sterile, making it nearly impossible to identify them positively. If sterile collections are made that are suspected of being hybrids, special care should be taken to collect both the parent material and the suspect hybrid material from the location. It should be noted that no known hybrids have been collected from Arizona.

Virtually all these populations of Potamogetonaceae and other aquatic plants are established by migrating waterfowl. They may appear or disappear depending on weather conditions, especially the frequency and length of dry conditions. Long-term monitoring of aquatic habitats, such as those reported below under each taxon, should prove interesting.

All illustrations (Figs. 1–4) are original and prepared by the author.

1. Submerged leaves with stipules free from the rest of the leaf, or adnate for less than ½ the length of the stipule; leaf blade or petiole directly attached to the node of the stem; leaves all submerged or both submerged and floating; blades of submerged leaves translucent, not channeled, flattened ..... ***Potamogeton***

1' Submerged leaves with stipules adnate to the base of the leaf and forming a sheath around the stem for 2/3 or more of the length of stipule; leaf blade or petiole not directly attached at the node of the stem; leaves all submerged; blades opaque, channeled, inflated..... ***Stuckenia***

## **Potamogeton** L. Pondweed

STEMS terete or compressed, with rhizomes present or absent, with turions present or absent. LEAVES submerged or both submerged and floating, alternate or rarely appearing opposite; submerged leaves sessile or petiolate, translucent, linear to orbiculate, 1–35-veined, not channeled, flattened; apex subulate to obtuse; base sessile or acute; margins entire to serrate, rarely crispate; stipules usually tubular and connate, if not, then rolled, free from the leaf base or adnate to the base for less than ½ the length of the stipule and freely ligulate to the apex; floating leaves petiolate, rarely sessile. INFLORESCENCES submerged or emergent, spikes or panicles of spikes, capitate or cylindrical; peduncles usually erect, inflorescence extended above the water surface. FLOWERS with 1 to 4 pistils. FRUITS dorsally keeled or rounded, beaked, compressed to inflated; embryo coiled 1 or more times. $x$ = 13 or 14. —ca. 100 spp., nearly worldwide. (Greek: *potamos* = river + *geiton* = neighbor). Reveal, J. 1977. Intermountain Flora vol. 6: 24–42; Haynes, R. R. and C. B. Hellquist. 2000. Flora of North America. 22: 48–70.

1. Leaves all of the same basic shape and form, all or nearly all submerged.
   2. Submerged leaf margins finely serrulate; fruit with curved beak 2–3 mm long ..... ***P. crispus***
   2' Submerged leaf margins entire (or nearly so); fruit with erect to slightly recurved beak less than 2 mm long.
      3. Submerged leaves narrowly linear or nearly so, less than 5 mm wide.
         4. Peduncles stout, usually recurved, 0.3–3.7 cm long; spikes congested, 1.5–7 mm long; leaves without basal glands; fruits with dorsal keel undulate, winglike, the beak 0.2–0.6 mm long ..... ***P. foliosus***
         4' Peduncles slender, erect, rarely recurved 0.5–6.6 cm long, spikes more open, capitate to cylindric, 1.5–10.1 cm long; leaves often with 2 basal glands at the nodes; fruit with a smooth dorsal keel, the beak 0.3–0.8 mm long ..... ***P. pusillus***
      3' Submerged leaves more broadly linear to greatly elongated or ovate, over 5 mm wide.
         5. Submerged leaves sessile, clasping the stem..... ***P. richardsonii***
         5' Submerged leaves petiolate or tapering to a sessile base, not strongly clasping the stem..... ***P. montezumawellensis***
1' Leaves dimorphic, the floating leaves usually broad, the submerged leaves narrower and usually elongated.
   6. Floating leaf blades obovate to elliptic, 0.8–1.6 cm long, 3–8.5 mm wide; submerged leaves narrowly linear, 1–1.3 cm long, 0.1–1.5 mm wide; fruits 1–1.5 mm long ..... ***P. diversifolius***
   6' Floating leaf blades lenticular to linear-lanceolate to ovate to broadly elliptic to ovate, longer than 3 cm; submerged leaves linear to ovate, 3.1–20 cm long, 0.7–35 mm wide; fruits 1.9–5 mm long.
      7. Submerged leaves sessile, ridged, 0.7–2.5 mm wide, narrowly linear; floating leaves ovate to broadly elliptic, 1.5–6 cm wide; fruits 3.5–5 mm long ..... ***P. natans***
      7' Submerged leaves petiolate, rarely sessile, lax, 3–35 mm wide, linear-lanceolate to lanceolate-elliptic to elliptic; floating leaves ovate to lanceolate to elliptic, 1.5–4.5 cm wide; fruits 1.9–4.3 mm long.
         8. Submerged leaves on petioles 2–10(–13) cm long; floating leaves lenticular to elliptic, 3–11 cm long, 1.5–4.5 cm wide, petioles 3.5–26 cm long; fruits 2.7–4.3 mm long, reddish..... ***P. nodosus***
         8' Submerged leaves sessile or on petioles up to 3 cm long; floating leaves narrowly to broadly elliptic or oblong-elliptic, 3.5–4 cm long, 1.6–2 cm wide, petioles 3–4.5 cm long; fruits 1.9–2.3 mm long, greenish..... ***P. gramineus***

***Potamogeton crispus*** L. (crisped, irregularly waved and twisted, kinky, curled). Curled Pondweed. —STEMS rhizomes absent; turions present; primary portion of stems flattened, to 100 cm tall, stout, and freely branching above. LEAVES all submerged; blades linear-oblong to linear-oblanceolate, 1.2–9 cm long, 4–10 mm wide, the veins 3 to 5, the apex rounded to rounded-acute, the base sessile, obtuse to rounded, rarely appearing nearly auriculate, the margins serrate, usually undulate, not crispate; stipules persistent, fraying early, to 5 mm long, not ligulate. INFLORESCENCES unbranched, emergent, terminal, rarely axillary; spikes, cylindric, 1–1.5 cm long, with few flowers in 3 to 5 whorls; peduncle 2.5–4 cm long. FLOWERS sessile or nearly so; perianth lobes orbicular, 1.2–2 mm wide. FRUITS sessile, ovate to obovoid, 5–6 mm long, 2–2.5 mm wide, inflated to slightly concave, the dorsal keel prominent, entire or slightly denticulate, the two lateral keels low and rounded to somewhat obscure, the beak stout, erect to slightly recurved, 2–3 mm long; embryo with 1 full coil. $2n = 52$. —Lakes, ponds, creeks, and rivers: Cochise, Coconino, Santa Cruz, Yavapai, Yuma cos.; 50–1,600 m (200–5,300 ft.); spring to summer; throughout most of N. Amer., C. Amer., S. Amer., Eurasia and Australia. Figs. 1A–C, 5A.

An easy species to recognize, with serrate leaf margins and fruits with an erect beak much longer than any of our other species. Introduced in the Americas. In Arizona, *P. crispus* has continued to spread and should be expected in other counties.

***Potamogeton diversifolius*** Raf. (with leaves of different shapes on the same individual). Water-thread Pondweed. —STEMS rhizomes present; turions absent; primary portion of stems compressed, 10–35 cm tall, slender and freely branched. LEAVES dimorphic, submerged, and floating; submerged leaves sessile, lax; submerged leaf blades narrowly-linear, 1–1.3 cm long, 0.1–1.5 mm wide, 1-veined, the apex acute, the base slightly tapering, not clasping, the margins entire; floating leaves, when present, petiolate, the petioles 7–8 mm long; floating leaf blades obovate to elliptic, 0.8–1.6 cm long, 3–8.5 mm wide, the veins 3 to 7, the apex rounded to acute, the base acute, the margins entire; stipules persistent, fraying early, inconspicuous, 1.5–2.3 cm long, ligulate. INFLORESCENCES unbranched, submerged, and emergent; submerged inflorescences axillary, with peduncles 3–5 mm long; spikes capitate, 2–3 mm long, 1 to 6 flowers in 1 to 3 whorls; emergent inflorescences axillary or terminal, erect to slightly recurved above surface of water, with peduncles 6–15 mm long; spikes cylindric, 5–9.7 mm long, 4–8-flowered, 2–4-whorled. FLOWERS sessile; perianth lobes suborbicular to broadly rhombic, 0.7–1 mm wide. FRUITS sessile, orbicular, 1–1.5 mm long, 0.9–2 mm wide, compressed, the prominent dorsal keel sharp and undulate-dentate, the two lateral keels low and rounded, mostly entire, the beak erect, minute to 0.1 mm long; embryo with more than 1 coil. Chromosome number unknown. [*P. capillaceus* Poir.]—Lakes, ponds, tanks, and springs; Coconino, Navajo, Yavapai cos.; 700–2,450 m (2,200–8,000 ft.); summer-fall; throughout most of N. Amer. and Mex. Figs. 2A–C, 5B.

In Arizona, *Potamogeton diversifolius* is best recognized by its dimorphic leaves, smaller floating leaves (compared to other species with floating leaves), and narrowly linear submerged leaves (similar to those of *P. foliosus* and *P. pusillus*); fruit usually has a prominent dorsal keel that is sharp and undulate-dentate (similar to *P. foliosus*).

***Potamogeton foliosus*** Raf. (leafy). Leafy Pondweed. —STEMS rhizomes absent; turions uncommon; primary portion of stems terete to slightly compressed, 4–75 cm tall, filiform, mostly unbranched below, freely branched above. LEAVES all submerged; without basal glands at the nodes; blades narrowly linear, 1.3–8.2 cm long, 0.3–2.3 mm wide, the veins 1 to

5, the apex acute to apiculate, rarely with a bristle, the base sessile, tapering, not clasping, the margins entire; stipules persistent, fraying early, to 2–22 mm long, not ligulate. INFLORESCENCES unbranched, emergent, axillary; spikes congested, capitate to cylindrical, 1.5–7 mm long; flowers few in 3 to 5 whorls; peduncles stout, usually recurved, 0.3–3.7 cm long. FLOWERS sessile, perianth lobes flabellate, 0.6–1 mm wide. FRUITS sessile, obovate to nearly orbicular, 1.4–2.7 mm long, 1.1–2.2 mm wide, inflated to concave, the dorsal keel prominent, undulate-dentate, winglike, the two lateral keels obscure, the beak erect, 0.2–0.6 mm long; embryo with 1 coil. —2 subsp., N. Amer. and C. Amer.

Subsp. ***foliosus***. —LEAVES with stipules greenish to brown, delicate, tending to disintegrate. INFLORESCENCES with spikes continuous, rarely interrupted. FRUITS olive-green to green-brown, 1.5–2.7 mm long, 1.2–2.2 mm wide, the dorsal keel 0.2 mm long or more, the beak 0.2–0.6 mm long. $2n = 28$. —Lakes, ponds, tanks, ditches, springs, creeks, and rivers; Apache, Cochise, Coconino, Gila, Graham, Greenlee, Mohave, Navajo, Pima, Santa Cruz, Yavapai cos.; 350–2,600 m (1,100–8,500 ft.); summer-fall; throughout most of N. Amer. and C. Amer. Figs. 2D–F, 5C.

In Arizona, *Potamogeton foliosus* subsp. *foliosus* is most easily confused with either of the subspecies of *P. pusillus* because they only have narrowly linear submerged leaves. This taxon is recognized by its capitate inflorescence on a short peduncle and the fruit with a dorsal keel that is prominently undulate-dentate. Although, *P. diversifolius* also has an undulate-dentate dorsal keeled fruit, the dimorphic leaves and shorter submerged leaves (1–1.3 cm long) easily separate it from *P. foliosus* subsp. *foliosus*.

***Potamogeton gramineus*** L. (grass-like). —STEMS rhizomes present; turions absent; primary portion of stems terete to flattened, to 150 cm tall, slender, and freely branched, especially near the top. LEAVES dimorphic, submerged, and floating; submerged leaves lax, sessile, or rarely petiolate, the petioles to 3 cm long, the blades elliptic, 3.1–9.1 cm long, 3–27 mm wide, the veins 3 to 9, with apex acuminate, with base attenuate, not clasping, with margins entire, rarely crispate; floating leaves, when present, petiolate, the petioles 3–4.5 cm long, with leaf blades ovate to elliptic, 3.5–4 cm long, 1.6–2 cm wide, the veins 11 to 13, the apex acuminate, the base rounded, the margins entire; stipules persistent, fraying early, inconspicuous, 1.3–1.6 cm long, not ligulate. INFLORESCENCES unbranched, emergent, axillary and terminal, erect to ascending; spikes cylindric, 15–35 mm long, multi-flowered in 3 to 5 whorls; peduncle 3.2–7.7 cm long. FLOWERS sessile; perianth lobes orbicular, 2–3 mm wide. FRUITS sessile, greenish, ovoid, 1.9–2.3 mm long, 1.8–2 mm wide, laterally compressed, the dorsal keel sharp and prominent, the two lateral keels rounded and obscure, the beak erect, 0.3–0.5 mm long; embryo with less than 1 coil. $2n = 52$. [*P. gramineus* L. var. *maximus* Bennett]. —Lakes, ponds, tanks, and rivers; Apache, Coconino, Gila, Navajo, Yavapai cos.; 1,400–2,700 m (4,600–8,800 ft.); summer-fall; throughout N. Amer., Eurasia. Figs. 3A–B, 5D.

In Arizona, *Potamogeton gramineus* is a difficult species to separate. Superficially, it is similar to both *P. natans* and *P. nodosus* in having elliptic floating leaves. It tends to be a brighter green; the floating leaves are generally narrower with an acuminate apex, and the fruits are usually smaller than the other two species.

***Potamogeton montezumawellensis*** Ricketson, G. Ricketson & Greenawalt, (from Montezuma Well). Montezuma Well Pondweed. —STEMS rhizomes present; turions absent; primary portion of stems terete, to 8 m tall (making this one of the tallest aquatic plants in the

world), stout, 3–6 mm in diam., simple below, with 1–5 branches above near apex; nodal glands absent. LEAVES all submerged, no true floating leaves present; submerged leaf blades bright translucent green to dark green, narrow-lanceolate to narrowly elliptic, 2.5–18 cm long, 4-19 mm wide, the veins 11 to 13, the apex long acuminate, the acumen 10–22 mm long, the base acute to decurrent on the petiole, the margins entire, but appearing crispate or denticulate with age; petioles 0.3–1.8 cm long; stipules green, persistent, conspicuous, convolute, free from the blade, 1.1–4 cm long, fibrous or shredding at the tip, the apex acute, the margins entire, not ligulate. INFLORESCENCES unbranched emergent, axillary and terminal, erect to ascending, 6–17.5 cm long; spikes cylindrical, 2.5–3.7 cm long, multi-flowered in 15 to 30 whorls; peduncle terete, 2.3–15 cm long. FLOWERS sessile or on short pedicels to 0.5 mm long, the perianth lobes green to reddish with age, claw-like to orbicular, 3-lobed, 2.7–3 mm long, 1.8–2 mm wide, the lobes rounded, the margins entire; stamens sessile, adnate to the perianth, 1.5–1.7 mm long, 1.2–1.8 mm wide, anthers yellowish-green, ovate, 1.3–1.5 mm long, 0.3–0.6 mm wide; pistil sessile, laterally compressed, 1.5–2 mm long, 0.8–1 mm wide, with hump on dorsal ridge, with stigma and style sessile, lateral. FRUITS (fully formed, but appearing sterile) sessile or on short pedicels, obovoid, 4–4.2 mm long, 2.8–3 mm wide, laterally compressed. 2–2.2 mm wide, the dorsal keel obscure with few projecting knobs, the two lateral keels absent to obscure, the beak erect to slightly recurved, 0.2–0.3 mm long; embryo ½ to ¾ coiled. Chromosome number unknown. —Geothermal limnocrene spring; Yavapai Co.; 1,103 m (3,618 ft.), flowering and fruiting summer-fall; endemic to Montezuma Well. Figs. 1D–E, 6A (dot), 8E.

***Potamogeton natans*** L. (swimming, floating on or under the surface of water). Floating-leaf Pondweed. —STEMS rhizomes present; turions absent; primary portion of stems terete, 30–90 cm tall, slender, simple, or rarely branched. LEAVES dimorphic, submerged, and floating; submerged leaves sessile, rigid, with leaf blades narrowly linear, 9–20 cm long, 0.7–2.5 mm wide, the veins 1 to 5, the apex obtuse, the base tapering, not clasping, the margins entire, often crispate; floating leaves petiolate, the petioles 5.5–29 cm long; floating leaf blades ovate to broadly elliptic, 3.5–11 cm long, 1.5–6 cm wide, the veins 17 to 37, obscure, the apex acute to round, the base cordate, the margins entire; stipules persistent, fraying early, conspicuous, 4.5–1 mm long, not ligulate. INFLORESCENCES unbranched, emergent, terminal, erect to ascending; spikes cylindric, 25–50 mm long, with 8–15 multi-flowered whorls; peduncle 4.5–9.5 cm long. FLOWERS sessile or on short pedicels to 0.5 mm long; perianth lobes orbicular, 1.5–3 mm wide. FRUITS sessile, obovoid, 3.5–5 mm long, 2–3 mm wide, inflated, the dorsal keel prominently rounded, the two lateral keels less prominent, rounded; the beak erect to apically recurved, 0.4–0.8 mm long; embryo with 1 coil. $2n = 52$. —Lakes, ponds, pools, tanks, marshes, springs, and streams; Apache, Coconino, Greenlee, Navajo, Santa Cruz, Yavapai cos.; 1,700–2,750 m (5,600–9,100 ft.); summer-fall; throughout N. Amer., Eurasia. Figs. 3C–D, 6B.

In Arizona, *Potamogeton natans* is a difficult species to separate. Superficially, it is similar to both *P. gramineus* and *P. nodosus* in having elliptic floating leaves. In *P. natans,* the submerged leaves are usually sessile, rigid narrowly linear, 0.7–2.5 mm wide; the floating leaves usually turn reddish-brown earlier, and the bases are usually more cordate.

***Potamogeton nodosus*** Poir. (knotted, knobby). Long-leaf Pondweed. —STEMS rhizomes present; turions absent; primary portion of stem terete, to 100 cm tall, stout, and simple or branched at the top. LEAVES dimorphic, submerged and or floating; submerged

leaves petiolate, lax, the petioles 2–10(–13) cm long; submerged leaf blades linear-lanceolate to lanceolate-elliptic, 9–20 cm long, 10–35 mm wide, the veins 7 to 15, the apex acute, not sharply mucronate, the base acute, not clasping, the margins entire often crispate; floating leaves, when present, petiolate, the petioles 3.5–26 cm long, the blades lenticular to elliptic, 3–11 cm long, 1.5–4.5 cm wide, the veins 9 to 21, the apex acute to round, the base cuneate to rounded, the margins entire; stipules persistent, fraying early, conspicuous, not ligulate 3–9 cm long. INFLORESCENCES unbranched, emergent, terminal, erect to ascending; spikes cylindrical, 20–70 mm long, multi-flowered, in 10 to 17 whorls; peduncle 3–15 cm long. FLOWERS sessile; perianth lobes orbicular to elliptical, 1.4–2.6 mm wide. FRUITS sessile, reddish, obovoid, 2.7–4.3 mm long, 2.5–3 mm wide, the dorsal keel sharp and prominent, the two lateral keels rounded and less prominent, the beak erect to 1 mm long; embryo with 1 coil. $2n = 52$. —Lakes, ponds, tanks, springs, creeks, and rivers; Coconino, Gila, Graham, Maricopa, Santa Cruz, Yavapai cos.; 400–2,350 m (1,300–2,300 ft.); summer-fall; throughout N. Amer., Mex., C. Amer., W. Ind., S. Amer., Eurasia. Figs. 3E–F, 6C, 8A–B.

In Arizona, *Potamogeton nodosus* is a difficult species to separate. Superficially, it is similar to both *P. gramineus* and *P. natans* in having elliptic floating leaves. In *P. nodosus*, the submerged leaves are typically petiolate; the floating leaves usually turn reddish-brown early. The bases are cuneate to rounded, compared to cordate in *P. natans* and rounded in *P. gramineus*.

***Potamogeton pusillus*** L. (very small). Small-Leafed Pondweed. —STEMS rhizomes absent; turions present; primary portion of stems terete to slightly compressed, 19–150 cm tall, slender, usually much branched, more so above than below. LEAVES all submerged, often with two basal glands at the nodes; blades linear, 0.9–6.5 cm long, 0.2–2.5 mm wide, the veins 1 to 5, the apex subulate to acute, the base sessile, tapering, not clasping, the margins entire; stipules persistent, inconspicuous, 3.1–9.2 mm long, not ligulate. INFLORESCENCES unbranched, submerged or emergent, axillary or terminal, erect, rarely recurved; spikes capitate or cylindrical, 1.5–10.1 mm long, few-flowered, in 1–5 whorls, interrupted (with spaces between whorls) or not; peduncle slender, 0.5–6.6 cm long. FLOWERS sessile; perianth flabelliform, 1.2–2 mm wide. FRUITS sessile, ovoid to obovoid, 1.5–2.2 mm long, 1.2–1.6 mm wide, inflated, the dorsal keel obscure or lacking, the two lateral keels essentially lacking, the beak erect, 0.1–0.6 mm long; embryo less than 1 full coil. $2n = 26$. —3 subsp., nearly worldwide.

In Arizona, *Potamogeton pusillus* is represented by two subspecies; these are most easily confused with *P. foliosus* subsp. *foliosus* because they have narrowly linear submerged leaves. In general, *P. pusillus* is recognized by its generally longer inflorescence on a slender peduncle and the fruit with a dorsal keel that is essentially smooth. The two subspecies are distinguished in the following key.

1. Leaf blades with 0 to 2 rows of lacunae along midrib; apex acute, rarely apiculate, rarely with a bristle; stipules connate; inflorescences 1 to 3 per plant; spikes cylindric, the whorls interrupted; fruits obovoid, sides concave; beak towards adaxial edge, rarely median..... ***P. pusillus*** subsp. ***pusillus***
1' Leaf blades with 1 to 5 rows of lacunae along midrib; apex acute to obtuse; stipules convolute; inflorescences more than 3 per plant; spike capitate to cylindrical, the whorls not interrupted; fruits widest at middle or ovoid, sides rounded; beak median, rarely towards adaxial edge..... ***P. pusillus*** subsp. ***tenuissimus***

Subsp. ***pusillus***. —LEAVES with submerged blades 1.4–6.5 cm long, 0.5–1.9 mm wide, the veins 1 to 3, the apex acute, rarely apiculate, rarely with a bristle, lacunae 0 to 2 rows on

each side of the midrib; stipules connate. INFLORESCENCES 1 to 3 per plant; spikes cylindric, the whorls interrupted. FRUITS obovoid, the sides concave, the beak toward the adaxial edge, rarely in the middle. —Lakes, ponds, tanks, and springs; Apache, Coconino, Graham, Greenlee, Maricopa, Navajo, Pima, Yavapai cos.; 1,050–2,750 m (3,400–9,000 ft.); summer-fall; throughout N. Amer., S. Amer, Eurasia and Afr. Figs. 2G–I, 6D.

Subsp. ***tenuissimus*** (Mert. & W. D. J. Koch) R. R. Haynes & Hellq. (slender leaved). Slender Leaved Pondweed. —LEAVES with submerged blades 0.9–5.4 cm long, 0.2–2.5 mm wide, the veins 1 to 5, the apex acute to obtuse, lacunae 1 to 5 rows on each side of the midrib; stipules convolute. INFLORESCENCES more than 3 per plant; spikes capitate to cylindrical, the whorls continuous, not interrupted. FRUITS ovoid, the sides rounded, rarely concave, the beak medial, rarely toward the adaxial edge. [*P. pusillus* var. *tenuissimus* Mertens & W. D. J. Koch; *P. berchtoldii* Fieber; *P. berchtoldii* Fieber var. *tenuissimus* (Mertens & W. D. J. Koch) Fern.]. —Lakes, ponds, and tanks; Apache, Coconino, Mohave, Navajo, Santa Cruz cos.; 1,650–2,850 m (5,400–9,350 ft.); summer–fall; throughout N. Amer., Eurasia. Figs. 2J–K, 7A, 8C–D.

***Potamogeton richardsonii*** (A. Benn.) Rydb. (Named for John Richardson, 1787–1865, Artic Explorer). Richardson's Pondweed. —STEMS rhizomes present; turions absent; primary portion of stems terete, to 100 cm tall, stout, and freely branching above. LEAVES all submerged; blades ovate-lanceolate to narrowly lanceolate, 1.6–13 cm long, 5–28 mm wide, the veins 3 to 35, the apex acute to obtuse, the base sessile, rounded, clasping, the margins entire to crispate; stipules persistent, conspicuous, 1.2–1.7 mm long, not ligulate. INFLORESCENCES unbranched, emergent, axillary or terminal, erect to rarely recurved; spikes cylindrical, 1.3–3.7 cm long, multi-flowered, with 3 to 7 whorls; peduncle 1.5–14.8 cm long. FLOWERS sessile; perianth lobes orbicular, 1–2.4 mm wide. FRUITS sessile, obovoid, 2.2–4.2 mm long, 1.7–2.9 mm wide, inflated to slightly concave, the dorsal keel obscure, the two lateral keels obscure, the beak stout, erect, 0.4–0.7 mm long; embryo with 1 full coil. $2n = 52$. —Lakes; Apache Co.; 2,100–2,250 m (6,900–7,300 ft.); summer–fall; throughout n and w N. Amer. Figs. 1F–G, 6A (Xs).

In Arizona, *Potamogeton richardsonii* is easily recognized by only having broadly ovate to lanceolate submerged leaves with entire margins and clasping bases. *P. richardsonii* is only known from 3 historic collections, all from Apache County. Two sterile collections from Wheatfield Lake were gathered on consecutive days in July 1958, and a fruiting collection from Becker Lake was gathered in 1968. Because additional collections have not been made from these well-known locations, it is doubtful that this species is currently a part of our flora.

## ***Stuckenia*** Börner Pondweed

STEMS terete, subterete, to angled, often compressed; rhizomes present; turions absent. LEAVES all submerged, alternate, sessile, opaque, linear, 1–5-veined, channeled, inflated; apex notched, blunt, or short-apiculate, obtuse to acute; base acute; margins entire; stipules not tubular, adnate for 2/3 or more to the base of the stipules, the upper portion confluent across the top of the sheath forming a short hyaline ligule. INFLORESCENCES submerged spikes, capitate, or cylindrical; peduncles lax, usually on or just below the water surface. FLOWERS with pistils 4. FRUITS dorsally rounded, beaked or not, inflated; embryo with less than 1 full coil. $x = 13$. —ca. 6 species, nearly worldwide. (Named in honor of Wilhelm Adolf Stucken, 1860–1901.) [*Coleogeton* (Reichb.) Les & R. R. Haynes]. Les and

Haynes (1996); Haynes et al. (1998); Haynes and Hellquist (2000).

1. Leaves with apex retuse, obtuse or rounded, rarely apiculate; upper portions of stems sparsely branched; fruit without a distinct beak..... ***S. filiformis***
1' Leaves with apex acute, apiculate, cuspidate, rarely rounded; upper portions of stems freely branched; fruit with a distinct beak.
  2. Leaf blades 5.6–9.2 cm long, 0.2–1 mm wide; peduncles 4.5–11.4 cm long; beak in fruit erect, 0.5–1.1 mm long..... ***S. pectinata***
  2' Leaf blades 5–21 cm long, 0.4–8.5 mm wide; peduncles 1.2–5.2 cm long; beak in fruit erect or rarely recurved, 0.2–0.3 mm long..... ***S. striata***

***Stuckenia filiformis*** (Pers.) Börner (thread-like). Threadleaf Pondweed. —STEM freely branching below, sparsely branching above, whitish to greenish, subterete, 10–100 cm long. LEAVES on main stem only slightly larger than those on branches; blades filiform to linear, 1–15 cm long, 0.2–3.7 mm wide, the veins 1 to 3, the apex retuse, obtuse or rounded, rarely apiculate; stipular sheath often inflated, at least on the lower end, 1–9.5 cm long, the ligule 2–20 mm long. INFLORESCENCES terminal, erect, spikes cylindrical or monoliform, 0.5–5.5 cm long, multi-flowered in 2 to 9 whorls, the whorls mostly irregularly arranged; peduncle filiform to slender, 2–15 cm long. FLOWERS sessile; perianth orbicular, 1–2.5 mm wide; styles nearly wanting. FRUITS obovoid, 2–3 mm long, 1.5–2.4 mm wide, the dorsal keel low and rounded, the lateral keels low and obsolete or lacking, the beak wart-like, generally inconspicuous. $2n = 78$. [*Potamogeton filiformis* Pers.]. —5 subsp. Throughout much of N. Amer.; Asia, Eurasia.

Subsp. ***alpina*** (Blytt) R. R. Haynes, Les, & M. Král (alpine). Fineleaf Pondweed. —STEMS 10–30 cm tall. LEAVES with blades to 1 mm wide; stipules persistent, lower portion tightly clasping or slightly enlarged. INFLORESCENCES with whorls less than 2 cm apart. FRUITS numerous. [*Potamogeton marinus* forma *alpinus* Blytt]. —Ponds; Navajo Co.; ca. 1,750 m (5,700 ft.). Widespread in U. S. and Can. Figs. 4A–B, 7B.

In Arizona, *Stuckenia filiformis* subsp. *alpina* is only known from a single location in Navajo Co.

***Stuckenia pectinata*** (L.) Börner (with narrow close-set divisions like a comb). Sago-Pondweed. —STEMS freely branched throughout, whitish, terete, 30–100 cm long. LEAVES on main stem only slightly larger than those on the branches; blades linear, 5.6–9.2 cm long, 0.2–1 mm wide, the veins 1 to 3, the apex acute to mucronate or apiculate; stipular sheath not inflated, 0.8–1.1 cm long, the ligule ca. 0.8 mm long. INFLORESCENCES terminal or axillary, erect to ascending; spikes cylindrical or moniliform, 1.4–2.2 cm long, multi-flowered in 3 to 5 whorls, the whorls unequally spaced; peduncle very slender, 4.5–11.4 cm long. FLOWERS sessile or nearly so; perianth orbicular to elliptical, 1–2 mm wide; styles very short. FRUITS oblanceolate, 3.8–4 mm long, 2.5–3.1 mm wide, rounded, the dorsal keel obscure, the lateral keels obscure, the beak erect, 0.5–1.1 mm long. $2n = 78$. [*Potamogeton pectinatus* L.]. —Lakes, ponds, lagoons, tanks, springs, creeks, canals, and rivers; all cos. except Greenlee and Yuma, but should be expected; 350–2,200 m (1,100–7,300 ft.); summer-fall; throughout N. Amer., C. Amer., S. Amer., Eurasia, and Australia. Figs. 4C–E, 7C.

***Stuckenia striata*** (Ruiz & Pav.) Holub (striate, marked with striae). Nevada Pondweed. —STEMS freely branching above, sparsely branching below, whitish to greenish, terete to angled, to 200 cm long. LEAVES on main stem 2 or more times larger than those on the

branches; blades linear, 5–21 cm long, 0.4–5.1 mm wide, the veins 3 to 5, the apex apiculate, cuspidate or rarely rounded; stipular sheath not inflated, 1.2–3.4 cm long, the ligule 2–11 mm long. INFLORESCENCES axillary, rarely terminal, erect to ascending, spikes cylindrical, rarely moniliform, 1.3–4.5 cm long, multi-flowered in 4 to 9 whorls; peduncle slender, 1.2–5.2 cm long. FLOWERS sessile; perianth semi-orbicular, 4–5.4 mm wide; styles very short. FRUITS obovoid to oblanceolate, 3–3.9 mm long, 2.8–3 mm wide, slightly compressed, the dorsal keel obscure, the lateral keels rounded, the beak erect or rarely recurved to apex, 0.2–0.3 mm long. Chromosome number unknown. [*Potamogeton striata* Ruiz & Pav.]. —Slow moving water: Maricopa, Pima, Pinal cos; ca. 400 m (ca. 1,300 ft.); summer-fall; CA, CO, ID, NM, NV, OR, TX, UT; Mex., C. Amer., S. Amer. Figs. 4F–G, 7D.

*Stuckenia striata* is only known in Arizona from three historic collections: Pinal Co., Sacaton, irrigation ditch, 17 April 1928, *R. H. Peebles 5263*; Maricopa Co., Granite Reef Dam, Salt River, 9 October 1938, *R. H. Peebles 14191*; and Pima Co., Santa Cruz Creek, Tucson, 1881, *J. G. Lemmon 579*. This species has not been recollected, and it is doubtful that it is currently a member of our flora.

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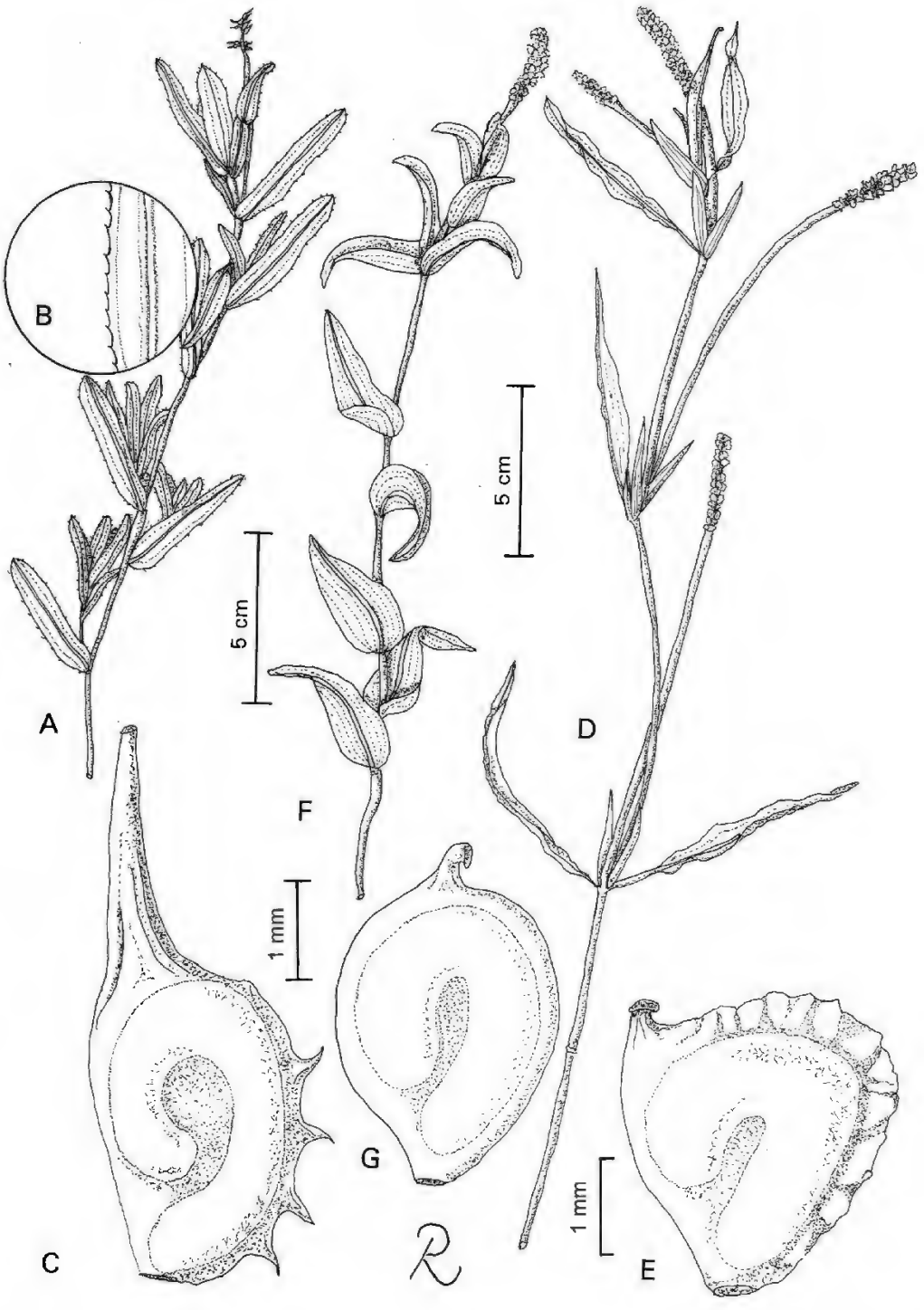
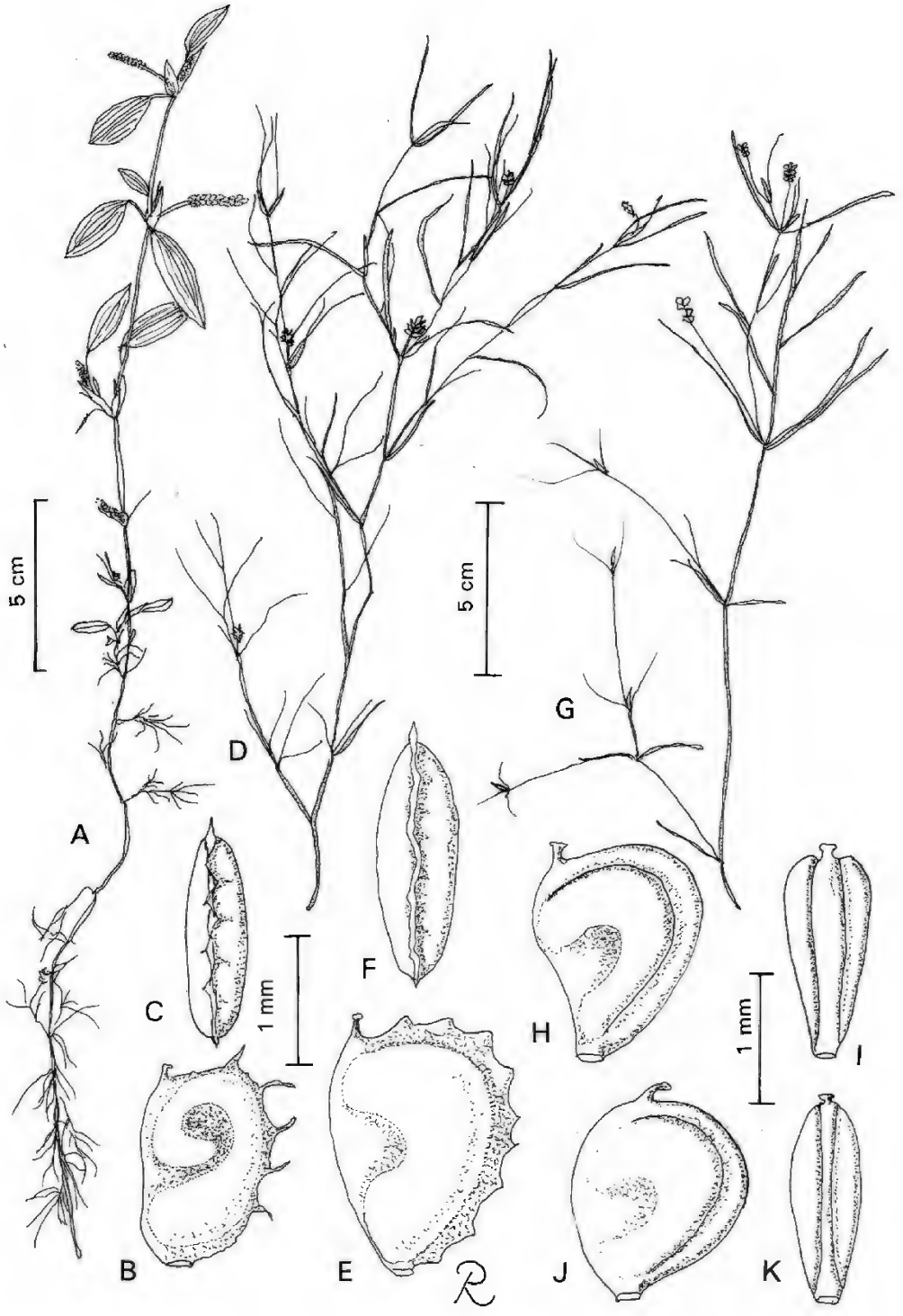
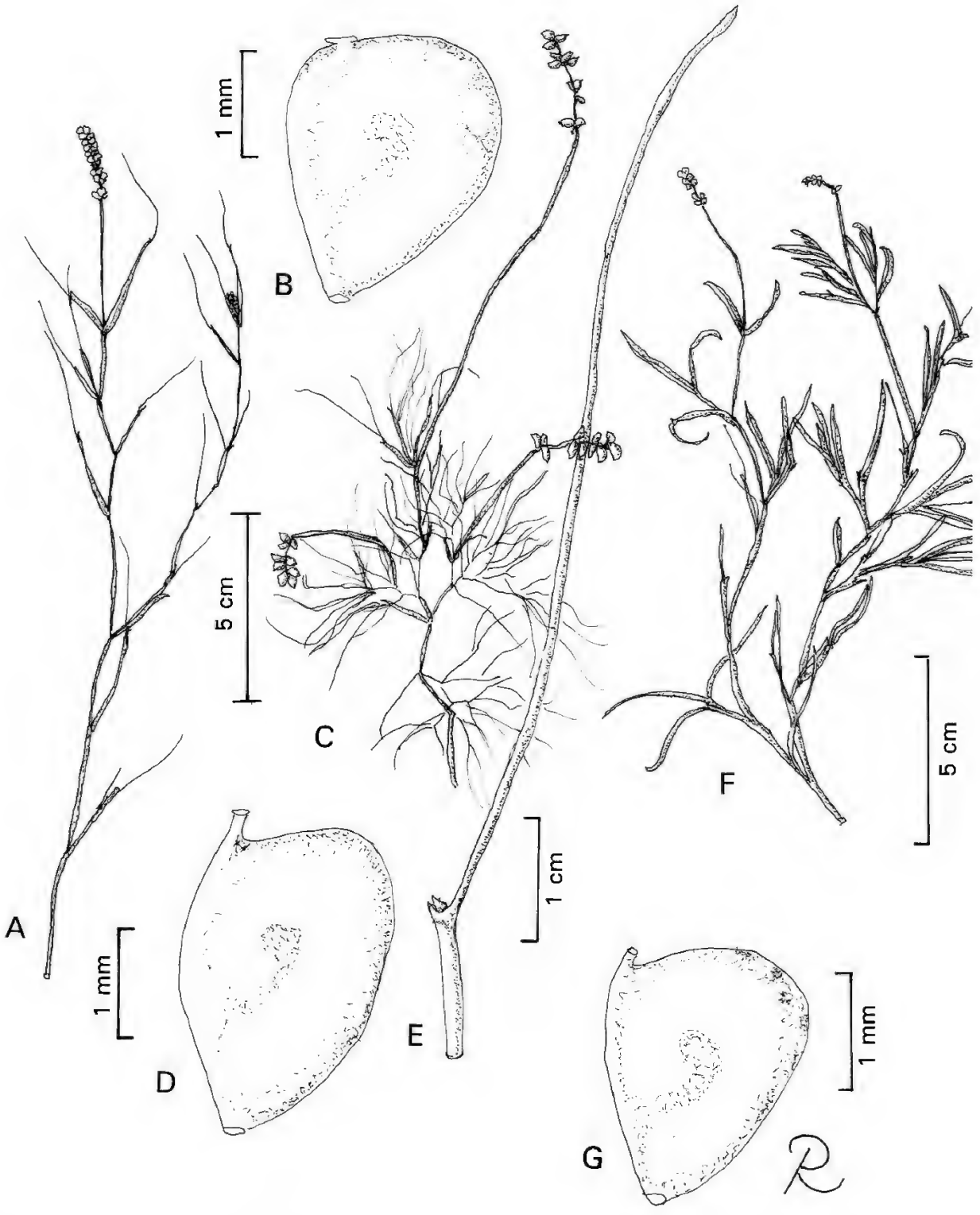



**Potamogetonaceae** Figure 1. A-C, *Potamogeton crispus*: A) Habit. B) Leaf margin detail. C) Fruit. D-E, *Potamogeton montezumawellensis*: D) Habit. E) Fruit. F-G, *Potamogeton richardsonii*: F) Habit. G) Fruit. Drawings by Jon Ricketson.

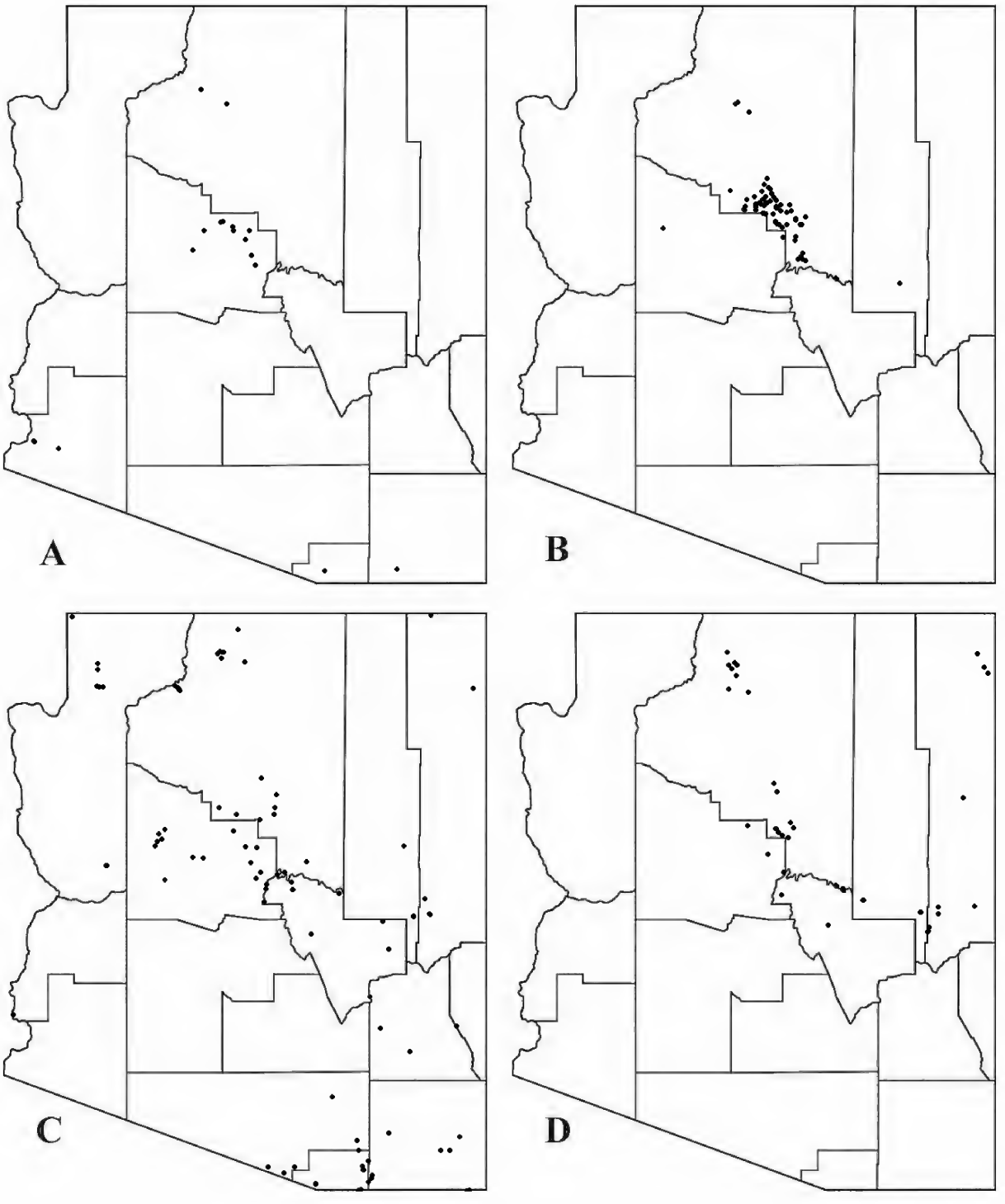



**Potamogetonaceae** Figure 2. A-C, *Potamogeton diversifolius*: A) Habit. B) Fruit, lateral view. C) Fruit, dorsal view. D-F, *Potamogeton foliosus* subsp. *foliosus*: D) Habit. E) Fruit, lateral view. F) Fruit, dorsal view. G-I, *Potamogeton pusillus* subsp. *pusillus*: G) Habit. H) Fruit, lateral view. I) Fruit, dorsal view. J-K, *Potamogeton pusillus* subsp. *tenuissimus*: J) Fruit, lateral view. K) Fruit, dorsal view. Drawings by Jon Ricketson.

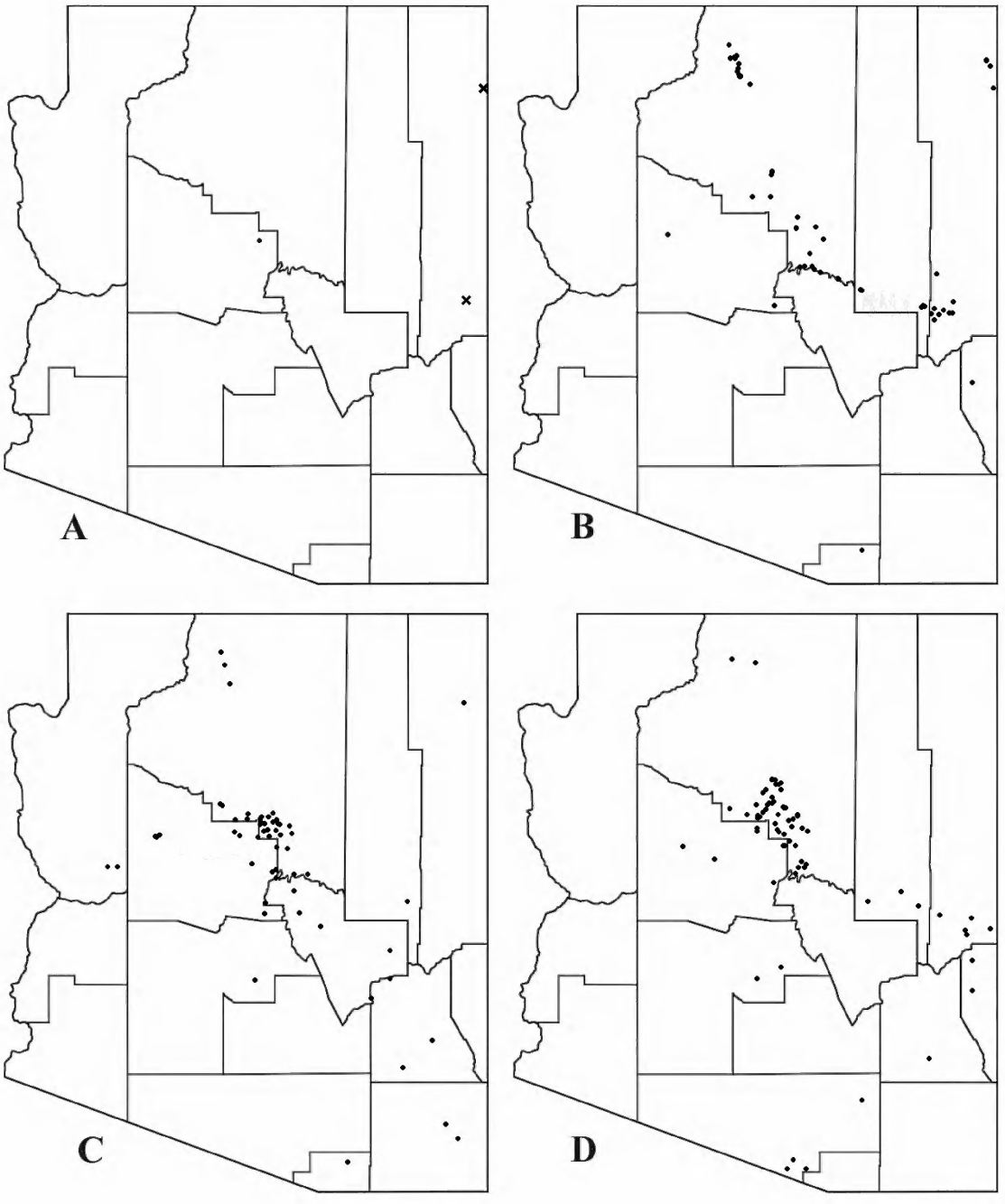
**Potamogetonaceae** Figure 3. A-B, *Potamogeton gramineus*: A) Habit. B) Fruit. C-D, *Potamogeton natans*: C) Habit. D) Fruit. E-F, *Potamogeton nodosus*: E) Habit. F) Fruit. Drawings by Jon Ricketson.



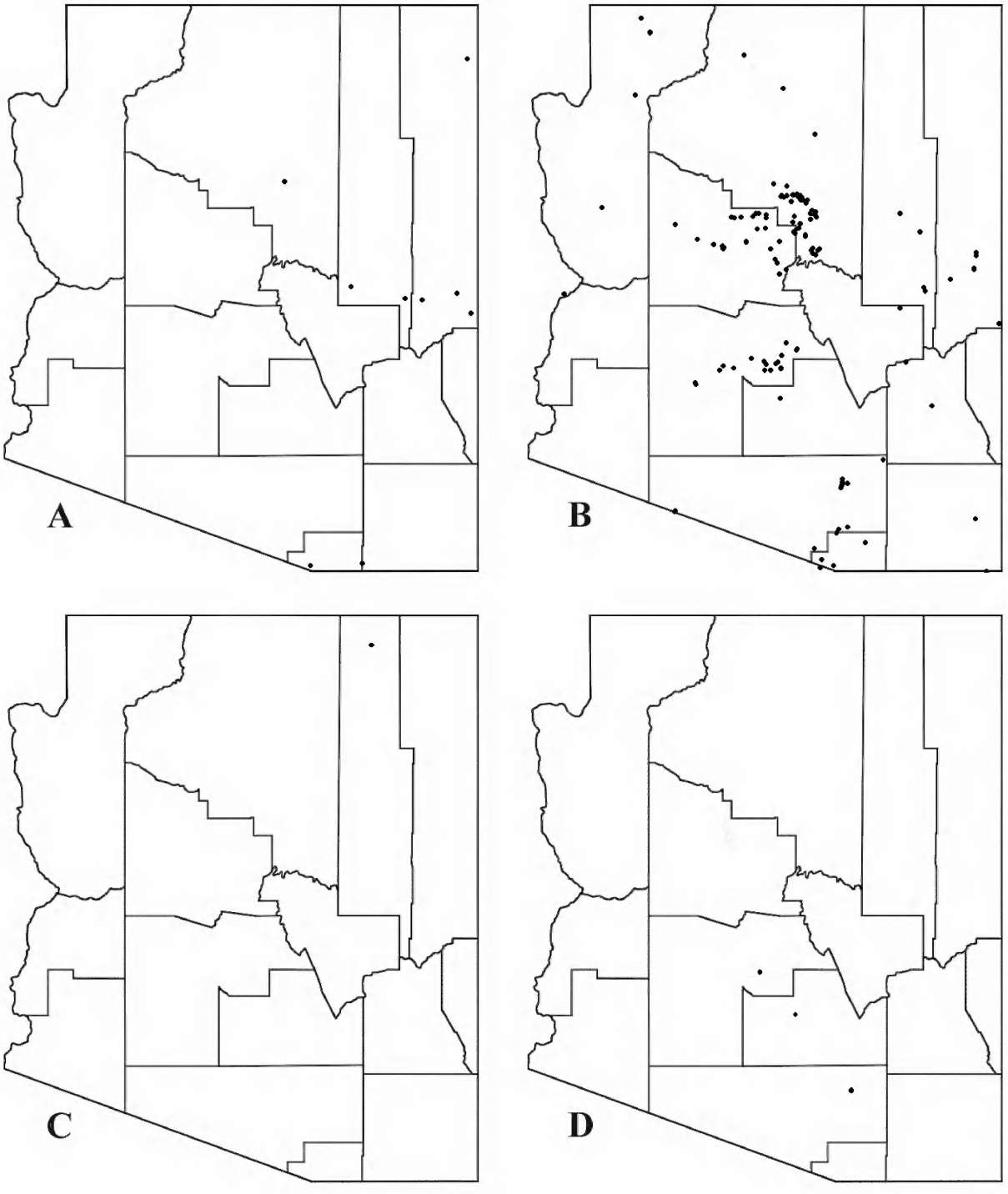

**Potamogetonaceae** Figure 4. A-B: *Stuckenia filliformis* subsp. *alpina* A) Habit. B) Fruit. C-E: *Stuckenia pectinata* C) Habit. D) Fruit. E) Stipular sheath and leaf. F-G: *Stuckenia striata* F) Habit. G) Fruit. Drawings by Jon Ricketson.



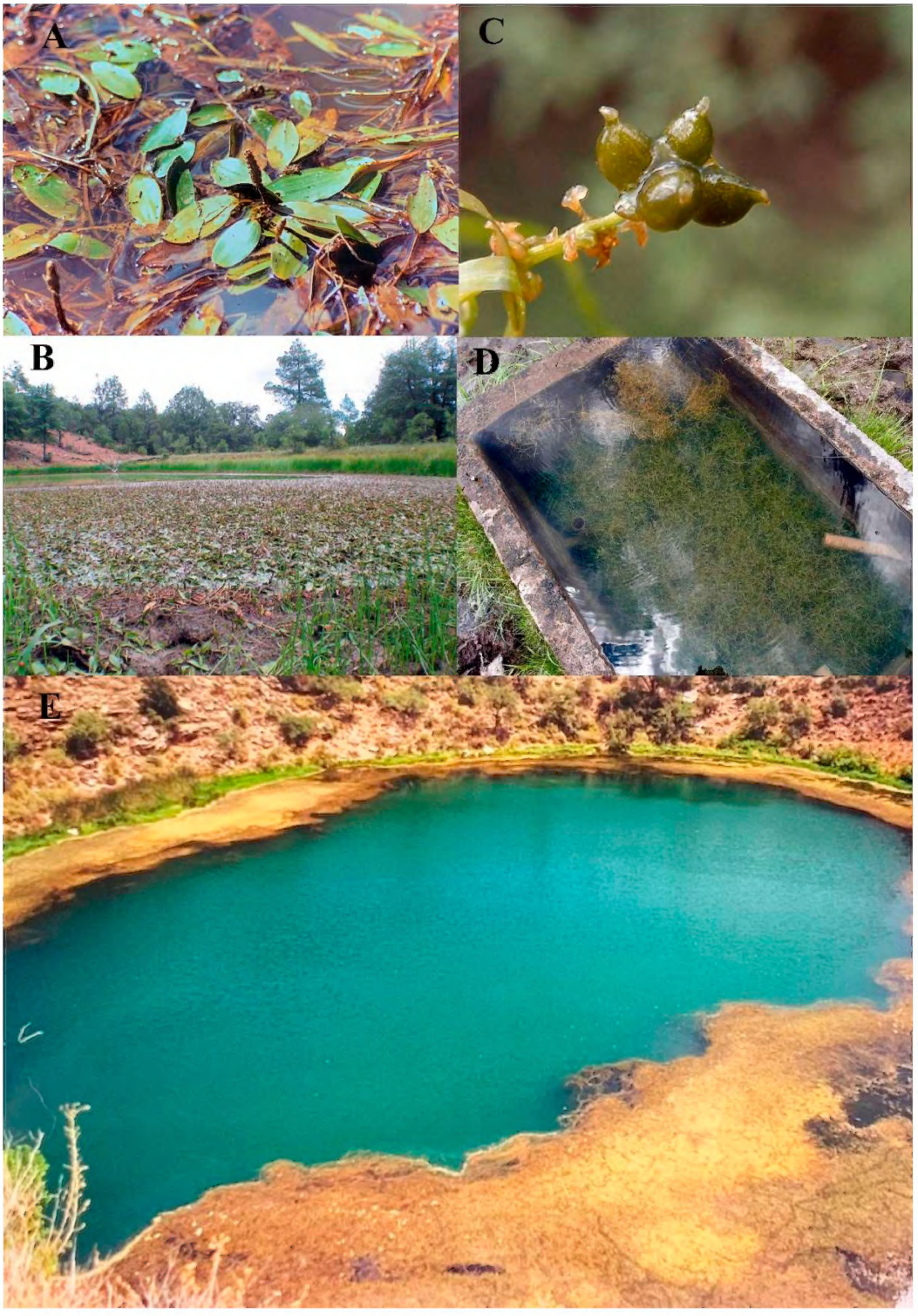

**Potamogetonaceae** Figure 5. Distribution maps of *Potamogeton*: A) *P. crispus*. B) *P. diversifolius*. C) *P. foliosus* subsp. *foliosus*. D) *P. gramineus*.




**Potamogetonaceae** Figure 6. Distribution maps of *Potamogeton*: A) *P. montezumawellensis* [dot] and *P. richardsonii* [Xs]; B) *P. natans*; C) *P. nodosus*; D) *P. pusillus* subsp. *pusillus.*




**Potamogetonaceae** Figure 7. Distribution maps of *Potamogeton* and *Stuckenia*: A) *P. pusillus* subsp. *tenuissimus;* B) *S. filiformis* subsp. *alpina*; C) *S. pectinata*; D) *S. striata*.

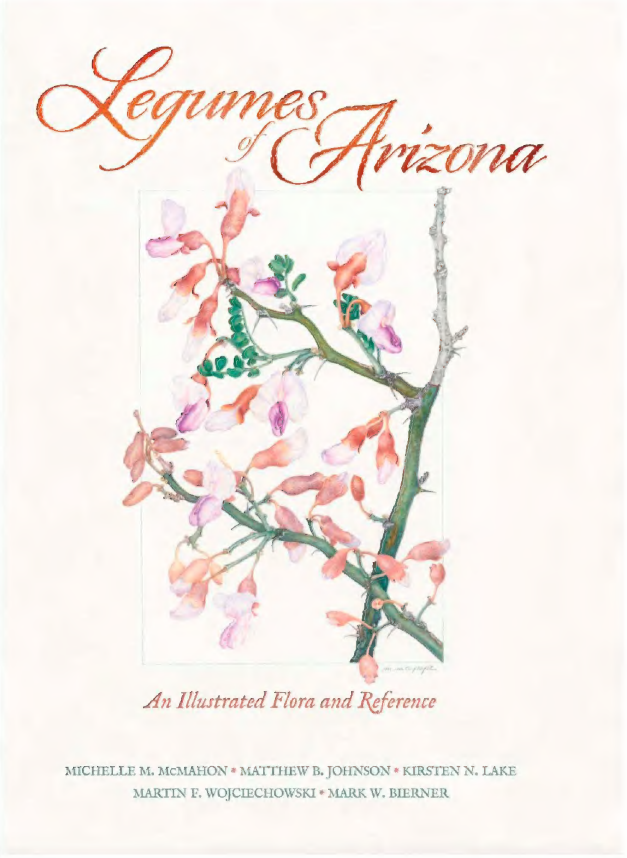



**Potamogetonaceae** Figure 8. Photos of *Potamogeton*: A) *Potamogeton nodosus*. B) *P. nodosus* growing in cattle tank with receding water level in Sierra Ancha mountains, Tonto National Forest, Gila Co. C–D) *P. pusillus* subsp. *tenuissimus* growing near Tejano Spring on Salero Ranch W end of Grosvenor Hills, fruits and habit in concrete water trough in Santa Cruz Co. E) *P. montezumawellensis*, in the fall it is part of the yellowish vegetation around the margin of Montezuma Well, a natural geothermal limnocrene spring in Yavapai Co.

## Publication announcement: *Legumes of Arizona – an Illustrated Flora and Reference*

We're delighted to announce the publication of *Legumes of Arizona – an Illustrated Flora and Reference* by BRIT Press (shopbritpress.org). The project involved five editors, 40 authors, 28 illustrators, 7 photographers, a managing editor, a copy editor and a map maker — all contributing deep expertise, on a generously volunteer basis.

The aim of the book is to present information on all 89 genera and 381 species that are native, naturalized, or commonly cultivated in Arizona. To set the context, eight introductory chapters provide perspective on geology, geography, weather, and climate, as well as a history of botanical exploration and a description of modern bioprospecting. Keys cover the non-cultivated and commonly cultivated taxa together, to facilitate identification of any legume in the state. Maps provide generalized ranges, each genus has at least one hand-drawn illustration, and several pages of color photos are included. Cultural and horticultural uses are provided throughout.


Legumes of Arizona
An Illustrated Flora and Reference
MICHELLE M. McMAHON • MATTHEW B. JOHNSON • KIRSTEN N. LAKE
MARTIN F. WOJCIECHOWSKI • MARK W. BIERNER

The book is the product of a collaboration between the University of Arizona Herbarium, the Boyce Thompson Arboretum, and the Desert Legume Program (now housed at BTA).

McMahon, M. M., M. B. Johnson, K. N. Lake, M. F. Wojciechowski, and M. W. Bierner. 2024. *Legumes of Arizona – an Illustrated Flora and Reference*. Sida, Bot. Misc. 64, Botanical Research Institute of Texas, Fort Worth, Texas, USA.

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